THE EFFECTS OF A COMPUTER-BASED CAREER COUNSELING PROGRAM ON THE VOCATIONAL MATURITY OF COMMUNITY COLLEGE STUDENTS

By

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The concepts that vocational behavior is a developmental process and that career intervention programs can facilitate this process have been generally accepted in the counseling profession during the past decade. Recently several types of career guidance techniques have been devised, including computer-based interactive career guidance programs. The System of Interactive Guidance and Information (SIGI), developed by the Educational Testing Service for use with community college students, is one of the most recent computer guidance programs. It was designed to assist students in clarifying their occupational values, in gaining greater knowledge of self and of specific occupations, and in increasing decision-making skills.

One method of determining the effectiveness of a career guidance program is to study its impact on clients' career development. Researchers have relied on career maturity indices as a measure of one's relative career development, and several investigators have employed Crites' Career Maturity Inventory (CMI) to study the effects of guidance programs on the vocational maturity of participants.

An experimental study was designed to discover the effects of SIGI on community college students' vocational maturity, as measured by the CMI and a questionnaire developed by the author. Eighty-four students enrolled in a personal development course were subjects for the investigation and were randomly assigned to the two treatment and two control groups of a Solomon group design.

It was hypothesized that SIGI would have an impact on subjects' attitudes toward careers (as measured by the CMI Attitude Scale) and would increase subjects' knowledge of themselves, their knowledge of careers, and their decision-making skills (as measured by the CMI Competence Test - Part 1, Part 2, and Part 3). It was also hypothesized that SIGI would increase one's specific decision-making abilities on the choice of an academic major and on an occupation, and would increase one's commitment to educational and occupational decisions (all as measured by the author's questionnaire). Finally, differential effects of the SIGI program on males compared to females and on subjects in the vocational-technical program compared to those in the university transfer program were studied.

There were no significant differences between treatment and control subjects in their scores on the CMI Attitude Scale or on the three Competence Test scales. Thus SIGI did not affect one's career maturity, as measured by these instruments. No differences were found between treatment and control subjects' ability to state either an occupational or educational choice. There was a tendency, however, for treatment subjects to change their educational or career choices or to be undecided about a career, and SIGI may have stimulated them to consider a wider variety of occupations than they had previously considered. While differences were not significant, subjects involved with SIGI tended to be more committed to the academic and career choices they had already made than were control subjects. SIGI thus appeared to provide reinforcement for these decisions.

On the basis of the variables studied, SIGI had no differential effects on subjects on the basis of sex or on the basis of academic program in which enrolled. Finally, there were no interaction effects between the pretest and the experimental treatment.

The limitations of the instruments used, the motivation of the subjects, and the time interval of the pretest and posttest were discussed as possible factors contributing to the results of the study. The findings suggest that further research on SIGI is warranted, particularly as it affects a student's values clarification, specific information on particular careers, and on his commitment to academic and vocational choices.

CHAPTER I

INTRODUCTION

During the past decade members of the counseling profession have placed increasing emphasis on the area of career guidance, in terms of both theoretical formulations and specific intervention techniques. One of the theories that has gained widespread acceptance since its early formulations in the 1950s is the concept that vocational behavior is a developmental process rather than a static choice point in an individual's life. The term "career development"[1] has thus become the focal point of many career theories, including those of Crites, Super, Ginzberg *et al.*, and Tiedeman. These theorists have identified stages of career development through which an individual progresses from early childhood through adulthood in choosing an occupation, and they have outlined specific developmental tasks which must be performed at each stage.

According to such theorists, each stage of career development usually occurs during a particular chronological age span. If the individual accomplishes the developmental tasks associated with the particular stage, he or she progresses to the next stage. Thus one's career maturity is relative to age and stage expectations. The individual is considered to be maturing in his career development if he satisfactorily completes the tasks at the expected rate and degree to which others in his own age group have completed the tasks. In its simplest form, career maturity can be defined as that point on the continuum of career development denoting the person's degree of attained development at a given time. This concept of vocational maturity is a crucial aspect of several career development theories since it is the standard or gauge of development useful in determining when and how to intervene in the individual's career development process.

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[1] The terms "career" and "vocation" are used synonymously in this study. See Tolbert, 1974, p. 25

Theorists have proposed particular elements or components of career maturity which have been corroborated by researchers. Five of the most common elements are: the attitudes an individual has about careers and the world of work; his sense of planning and accepting responsibility for decisions; his ability to make decisions; his knowledge about himself, his values, interests, and abilities; and his knowledge about occupations. A method of gauging career maturity was to study these facets of career development skills as exhibited in one's behavior. This led to the construction of instruments to measure one's career maturity, i.e., his degree of vocational development. These instruments have been utilized by practitioners for diagnostic purposes and, more commonly, for evaluating the outcomes of counseling and other career development intervention techniques.

A second characteristic of the past decade has been the development of new approaches to career guidance (any systematic activity designed to facilitate career exploration or career decision making). Most of these approaches have been influenced by career development theories and their general purpose has been to assist an individual in accomplishing the tasks associated with the particular stage of career development in which he is located, thus advancing his career maturity. The focus is on the process of decision making rather than on the content of the decision. Some of those career exploration approaches include new methods of individual developmental counseling, a variety of group counseling programs, career education curriculum approaches, use of multimedia techniques, and the application of computer technology to information dissemination and career exploration. One common method used by researchers in evaluating these new approaches is to study the impact of the technique on the relative level of career development as measured by career maturity indices.

The use of computers in career guidance has been one of the most recent techniques developed and is a promising approach in facilitating career exploration and decision making. Several computer-based career guidance programs are in the process of being developed, field tested, and implemented. However, little research exists on the impact of the programs on the career maturity of clients.

While several career exploration programs utilizing computer technology have been developed, only four could be termed "second generation" programs; they not only store, integrate, and retrieve information, but provide for interaction with a client. With these systems, the client has direct access to the computer and controls the interaction through the use of a cathode-ray tube similar to a television screen and a computer terminal similar to a typewriter. By punching keys, the client may ask questions of the computer, and answers flash on the screen. Similarly, the computer "asks" clients questions about his values, interests, and abilities. Through this interaction, the client purportedly learns more about not only the decision-making process but also about himself and careers, thus allowing him to integrate this knowledge in making educational and vocational decisions.

One such computer-based program designed along this format is the System for Interactive Guidance and Information (SIGI), developed by the Educational Testing Service. SIGI is designed primarily for use with community college students and assists clients in exploring their career values, deciding on educational and vocational fields, and making plans for implementing these decisions. During the period 1975-1977, SIGI is being field tested at four community colleges throughout the nation, including Santa Fe Community College, Gainesville, Florida. Comparatively little research has been conducted on the impact of any computer-assisted career guidance program on the client's level of career maturity, and none, to this author's knowledge, has been conducted on SIGI.

Rationale for the Study

The concept of the developmental nature of career behavior and its related notion of career maturity is well accepted in the counseling profession, and instruments based upon this concept have been developed to measure career maturity. Practitioners have assumed that one's career maturity can be facilitated through career intervention techniques, and research has generally supported this assumption for several career exploration programs. The use of computer-based programs, such as SIGI, is a relatively new approach to career exploration and guidance. Whether this program is an effective method of assisting clients in their career development, however, can only be determined by studying the results of the program. One such consequence which can be measured and evaluated is the degree to which SIGI affects the level of clients' career maturity, which is the focus of this investigation.

In addition to evaluating SIGI's effect on clients' career maturity, this investigation provides the student development staff of Santa Fe Community College with data-based information regarding the relative level of the career maturity of a sample of its students. The results of the investigation may assist in identifying some of the effects on these students from interacting with SIGI, as well as evaluate the relative benefits of the program, and thus provide input on how the staff may best utilize its computer services in assisting students in their career development.

Purpose of the Study

The purpose of this study, then, is to determine the impact of the computer assisted career guidance system, SIGI, on the career development of community college students, as measured by a career maturity inventory. The following questions are investigated:

1. What effect does the SIGI program have on the following components of a student's career maturity: (a) career choice attitudes, (b) knowledge about himself, (c) knowledge about occupations, and (d) planning and decision-making skills?

2. What effect does the SIGI program have on a student's making specific educational and occupational choices and what effects does SIGI have on the consistency and commitment of a student to these choices?

3. Is there a relationship between the variables of sex and type of academic program in which the student is enrolled and the amount of assistance received from the SIGI program?

CHAPTER II

A REVIEW OF RELATED LITERATURE

The review of literature related to the investigation is divided into the following broad areas: (a) concepts and theories of career development, (b) the indices and measures of career maturity, (c) facilitating career development, (d) the use of computers in career counseling, (e) the SIGI career exploration program, (f) the Career Maturity Inventory, and (g) a summary of the literature.

Concepts and Theories of Career Development

Prior to the 1950s, vocational psychologists had been studying how individuals in one occupation differed from those in other occupations and how successful persons differed from less successful ones within occupations. The emphasis was on matching the right person to the right job. Beginning in the 1950s, however, psychologists were devoting their attention to the study of vocational choice as a developmental process and were attempting to learn how vocational goals develop, how they are modified and implemented, what decisions about vocations confront an individual at various points in his life, and what were the factors that facilitated or hindered vocational progress. This was a

> ...shift away from the study of occupations to the study of careers, and a corresponding shift from the essentially static concept of vocational choice to the more dynamic concept of vocational development (Jordaan, 1974, p. 263).

During the 1950s and 1960s several psychologists proposed theories attempting to explain the process of career development, and three examples of such theories are briefly reviewed below.

Ginzberg, Ginsburg, Axelrod, and Herman (1951) perhaps made the first comprehensive statement of career development theory. They maintained that vocational choice was actually a series of choices an individual makes between his wishes and his possibilities, and further suggested that four variables were involved in a vocational choice: (1) reality factors (the environmental influences), (2) the influence of the educational process (the type and kind of education a person has received), (3) emotional factors, and (4) individual values. According to this theory, there are three periods in the process of career development, each period occurring at a general chronological age point: the fantasy period, the tentative period, and the realistic period. These periods are further divided into stages during which an individual is expected to accomplish specific developmental tasks.

During the fantasy period, which lasts approximately to the tenth year, a general maturation process of changing from a play to a work orientation occurs. The tentative period is composed of four stages: interest stage (ages 11-12), capacity stage (ages 12-14), value stage (ages 15-16), and transition stage (ages 17-18). During these stages, the adolescent considers the intrinsic enjoyment of occupations, his own abilities, his values, the service to society particular occupations provide, and finally, the responsibilities he has to make vocational decisions. The realistic period, occurring generally from ages 18-24, is divided into the exploration, crystallization, and specification stages. During this period an individual explores several occupations, makes a choice, becomes committed to that choice and finally implements his choice.

Donald Super (1953, 1957, 1963) has proposed perhaps the most comprehensive and influential theory of career development. A basic tenet of Super's theory is that in choosing an occupation, an individual is striving to implement his self concept. This developmental process occurs through five stages, which generally correspond to those proposed by Ginzberg and his associates. These stages, along with the approximate chronological age during which they occur are (1) the crystallization stage (ages 14-18), (2) the specification stage (ages 18-21), (3) the implementation stage (ages 21-24), (4) the stabilization stage (ages 25-35), and (5) the consolidation stage (ages 35-50). During each of these stages, particular developmental tasks must be achieved if growth is to occur, and specific attitudes and behaviors are related to each of these stages. The following attitudes and behaviors, for example, are related to the specification stage: (1) awareness of the need to specify, (2) use of resources in specification, (3) awareness of factors to consider, (4) awareness of contingencies which may affect goals, (5) differentiation of interests and values, (6) awareness of present-future relationships, (7) specification of a vocational preference, (8) consistency of preference, (9) possession of information concerning the preferred occupation, (10) planning for the preferred occupation, (11) wisdom of the vocational preference, and (12) confidence in specific preferences (Super, 1963).

Tiedeman (1961) proposed a theory of career development oriented toward the concept of decision-making, and he maintained that

> Vocational development, then, is self-development viewed in relation with choice, entry, and progress in educational and vocational pursuits. It is a process occurring over *time* in man who is capable of anticipation, experience, evaluation, and memory. . .vocational development

> ordinarily occurs within the context of several decisions (p. 18).

Vocational development is thus a series of decisions regarding school, work, and life which one makes as he matures. For each major choice, the individual progresses through the following periods: the period of anticipation, composed of the exploration, crystallization, and choice stages; and the period of implementation and adjustment, divided into the induction stage, transition stage and maintenance stage. Like Super, Tiedeman also suggests that there are particular behaviors or tasks which the individual must successfully accomplish before progressing to another stage.

A crucial aspect of each of these theories is the concept of vocational tasks which an individual must perform at each stage of development. Jordaan suggests that societal expectations "define the tasks he must deal with and the gains he should register at various stages of his life" (p. 270). For instance, at a particular time, the person is expected to know what type of work he plans to do for a living, to settle down to one job if he has been drifting from one job to another, to support a family, and to get ahead in his profession. Jordaan (p. 264-265) has outlined the directions in which career development might be expected to proceed:

1. Greater familiarity with and more effective use of environmental sources and opportunities.
2. Greater awareness of and concern with impending and eventual choices.
3. More effective and more systematic exploration of one's self and one's environment.
4. More extensive and more specific educational and occupational information.
5. Better understanding of the factors to be considered in making various kinds of choices.
6. Greater awareness of factors which might upset or delay one's

plans and of ways of circumventing or coping with these contingencies.

7. Greater willingness to assume personal responsibility for one's decisions.
8. Greater awareness of one's ability to determine the course and outcomes of events through the kinds of decisions one makes.
9. Greater awareness of personal assets and deficits and of their implications for choice.
10. A clearer, more complete, better integrated, and more realistic self-concept.
11. The translation of this self-concept first into general and then into more specific occupational terms.
12. Greater commitment to one's goals and subsequently to one's occupation.
13. More specific, stable, and realistic objectives.
14. More specific plans for achieving these objectives.
15. Goals, and eventually an occupation, which are more in accord with one's interests, abilities, values, personality traits, self-concept, work experience, and job skills.
16. Ability to compromise between desire and reality, between the hoped for and the feasible.
17. The selection of educational and occupational environments which are more compatible with one's personality and life-style.
18. Stable employment offering job security and prospects of a decent livelihood.

These directions have several implications for the college-age student who is in the process of choosing, and preparing to enter, an occupation. They suggest that the student should devote much of his time and energy in meeting these needs, yet there is evidence that colleges actually place little emphasis on achieving career development tasks. Korn (1968) observed that students do not have adequate opportunity to critically examine career goals because nowhere are they encouraged to do so.

> Most college students are given only a year or two in which to find both themselves and a vocational plan for their lives, and too often during this short period, while they are being offered encouragement to explore, their daily academic tasks are at odds with their goals. . .Much of the structure of higher education encourages them to put aside questions of personal relevance in favor of mastering a complexity of academic subject matter (p. 207).

The need for facilitating college students in meeting the developmental tasks outlined above is evident in many research studies, which are reviewed in a later section.

If career development is systematic and proceeds in directions suggested by several theorists, then "it should be possible to assess not only how much of the road the individual has covered, but also how fast he is traveling in comparison with others who are embarking on the same journey" (Jordaan, p. 270). This assessment of progress is essentially the concept of career maturity, to which many theorists and researchers have devoted their interests.

Career Maturity: Definitions, Indices, and Measures

Definitions

Super was the first to suggest that an individual's rate and progress in meeting vocational developmental tasks might be an indication of his vocational maturity. He defined vocational maturity as "the degree of development, the place reached on the continuum of vocational development from exploration to decline" and believed that one's vocational maturity could be assessed from two frames of references (Super, 1955, p. 153). The first method of estimating one's vocational maturity (Vocational Maturity I) is by comparing an individual's actual life stage and the developmental tasks with which he is dealing with those expected at his particular chronological age. The closer the correspondence between the two, the greater the individual's vocational maturity. The second method is comparing the methods an individual uses in handling the developmental tasks with the methods of others handling the same tasks.

According to Crites (1961) an individual could be considered mature by one of the above definitions and immature by the second definition. He proposed combining these definitions to provide a measure of both the degree and the rate of vocational maturity, and his definition of vocational maturity includes these two factors:

> Degree of vocational development refers to the maturity of an individual's vocational behavior and that of the oldest individual in his vocational life stage. . .In contrast, rate of vocational development refers to the maturity of an individual's vocational behavior in comparison with that of his own age groups (p. 259).

Although other researchers have proposed various definitions and concepts of vocational maturity, including Bartlett (1971) and Westbrook and Cunningham (1970), the definition proposed by Crites appears to be the most generally accepted and is the one used throughout this investigation.

The utility of the concept of career maturity is that it allows the counselor to assess the rate and level of an individual's career development. Vocationally mature behavior will assume different forms depending on the particular age and the corresponding life stage of development at that age. For instance, the vocationally mature fourteen-year-old will be assessing his interests and abilities in order to reach a decision on an educational plan while the vocationally mature 45-year-old man is concerned with maintaining his career status in the face of competition from younger men (Osipow, 1968, p. 123). These various behaviors and attitudes which are expected to occur at particular stages of development are the indices of career maturity.

Indices of Career Maturity

A number of research projects have been undertaken in attempts to validate the theories of career development and career maturity. These studies led to the development of indices to measure vocational maturity. Five dimensions of vocational maturity were investigated in Super's Career Pattern Study, a longitudinal study of ninth grade boys and their career behavior until they reached the age of thirty-five (Super and Overstreet, 1960). These dimensions were: (1) orientation to vocational choice, (2) information and planning about preferred occupations, (3) consistency of vocational preference, (4) crystallization of traits, and (5) wisdom of vocational preferences.

Gribbons and Lohnes (1968) proposed eight indices to assess vocational maturity: (1) factors in curricular choice, (2) factors in occupational choice, (3) verbalized strengths and weaknesses and their relationship to vocational choices, (4) accuracy of self appraisal, (5) evidence for self rating, (6) interests, (7) values, and (8) independence of choice. These indices were employed in their research measuring the readiness for vocational planning in adolescents.

Westbrook and Parry-Hill (1973) identified six indices of cognitive vocational maturity: (1) knowledge of occupations available in various work fields; (2) ability to choose most realistic occupations, considering one's known abilities, interests, and values; (3) knowledge of work schedules, income, and job location; (4) knowledge of amount of education required for an occupation; (5) knowledge of abilities, interests, and values generally required for various occupations; and (6) knowledge of duties performed in a wide range of occupations.

Crites (1973) proposed a model of four dimensions of career maturity which were derived in part from Super's original concepts. Consistency of career choices, the first dimension, includes consistency over time, within fields of occupations and within levels of occupations. Realism of career choices, the second factor, involves the variables of one's abilities, interests, personality, and social class. Career choice competencies include five variables: problem solving, planning,occupational information, self appraisal, and goal selection. The fourth dimension of Crites' model is career choice attitudes, composed of the conception, preference, independence, orientation, and involvement variables.

Measures of Vocational Maturity

Vocational maturity instruments, based upon the indices and dimensions discussed above, have been designed by several researchers, including Super (1973), Sheppard (1971), Forrest (1971), Crites (1965), Gribbons and Lohnes (1968), and Westbrook (1970, 1971).

The indices of Vocational Maturity, developed by Super and his associates (Super, 1955; Super, Crites, Moser, Overstreet, and Warnath, 1957; Super and Overstreet, 1960), originally utilized the format of structured interviews. It was constructed to assess the vocational maturity of subjects in the Career Pattern Study and had five scales corresponding to Super's five dimensions of vocational maturity. A new scale, the Career Development Inventory Form I (Super and Forrest, 1973) is a multiple choice written inventory composed of three subscales. Planning orientation, the first, includes concern with choice, specificity of planning and self-estimated knowledge of occupations. Resources for exploration (the knowledge and use of appropriate resources needed in planning) and information and decision making (actual occupational information and knowledge of vocational decision-making principles) are the other two subscales.

Super has constructed a more comprehensive inventory, the CDI-Form 9-30, to measure vocational maturity throughout the entire life span of the individual, including the establishment, maintenance, and decline stages. It is in the research and development stages and was constructed for use with subjects in the Career Planning Study when they reached age thirty-six (Jordaan, 1974).

The Readiness for Vocational Planning Scale was developed by Gribbons and Lohnes and purportedly measures the authors' eight dimensions of vocational maturity discussed previously. It is based on a semi-structured interview format.

The Cognitive Vocational Maturity Test (Westbrook and Parry-Hill, 1971) has six subtests and is designed to measure the cognitive domain of vocational maturity, discussed above.

Sheppard's Adult Vocational Maturity Inventory differs from other instruments; items are concerned with past occupational decisions rather than future decisions. Dimensions of the inventory are involvement in the vocational choice process, orientation toward work, independence in decision-making, preference for vocational choice factors, and conception of the choice process. In validity studies of the instrument, support was given for the theory that vocational maturity can continue into later life stages after adolescence. Results of these studies also "lent support for the hypothesis that age, education, and work history have little relationship with an individual's vocational maturity" (Sheppard, p. 405).

Two additional inventories designed to assess vocational maturity are the Career Questionnaire (Forrest, 1971) and the Vocational Decision Checklist (Harren, 1964). Forrest's instrument has three subscales:

planning orientation, resources for exploration, and decision-making and information, and was designed for use with adolescents. Harren's instrument is composed of two subscales, one concerning the choice of an academic major, the second with occupational choices. It was designed to provide a measure of one aspect of vocational development, i.e., academic and occupational decisions.

Perhaps the most widely used measure of career maturity is the Career Maturity Inventory (CMI), developed by John O. Crites. Constructed in 1961 as the Vocational Development Index, its name was changed in 1973 to reflect the current emphasis on "career" (rather than the limiting connotations of "vocation") and on "maturity" in order to convey the "concept of progressive change which underlies emerging career awareness exploration and decision-making--the variables which the Career Maturity Inventory has been constructed to measure" (Crites, 1973a, Foreword). The CMI is designed to measure two of the four dimensions of Crites' model of career maturity, career choice attitudes and career choice competencies. Because the CMI is used in the present investigation to assess career maturity, a detailed review of the instrument and relevant research is presented in a later section.

Facilitating Career Development

In addition to proposing theories of career development and constructing instruments to measure career maturity, vocational psychologists have also devoted their energies to developing methods of facilitating the career development of clients. These methods include new approaches to individual counseling, the use of group counseling techniques, self-directed career exploration inventories, multimedia programs, and the development of computer-assisted career exploration programs.

An abundant number of these new career counseling methods have been utilized with elementary, secondary, and college students. However, because the present investigation pertains only to college students, the review of methods of facilitating career development is devoted primarily to those used with this population. This review is divided into the following areas: (1) the need for career counseling of college students, (2) current career counseling practices, (3) recommended approaches to career counseling, (4) specific models in operation, and (5) research on career counseling in higher education.

The Need for Career Counseling

The need for assisting college students in their career development is of considerable importance since it is during this period that some specific career choices must be made. It is also evident from research on the career choice behaviors of college students that a great number of students require some type of assistance. Myers, in reviewing several such studies, concluded that "students cannot be given very high marks for the degree of vocational maturity obtained" after completing high school. He also believed that the findings from a number of studies showing that 20% of entering college freshmen cannot express a vocational choice lend support to the fact that a deficit exists for some college students (Myers, 1972, p. 61). Another study (Astin and Panos, 1969) of 36,000 college students at 246 institutions found that three fourths of students changed their career plans after entering college, and 18% of college freshmen were undecided on any academic major. These investigators also reported that 75% of their sample planned on earning a master's degree, and of these, 25% indicated plans to pursue doctorate degrees.

Other studies have reported that over one-half of college freshmen specifying occupational goals state their goals to be in the professions and sciences (Borow, 1973), and that only 36% of incoming freshmen students report that they have made a definite choice of an academic major (Devine, 1974). A related study (Ginn, 1974) found that 30% of Harvard University's Class of 1972 had no eventual career plans. Ginn suggested that this career indecision "arises from an individual's basic inability to make commitments and judgements about values, goals, and personal priorities" (p. 42). Gaymer (1972) has explored the predicaments in which college students find themselves when they believe they must decide now what they are going to do for the rest of their lives. According to Gaymer, counselors must assist students in understanding that a decision now is only one of many career decisions they will be making throughout their lives.

In longitudinal studies, Gribbons and Lohnes (1968) concluded that between one-third and one-half of young adults at age 25 appeared to be in career development trouble. Results of Super's Career Pattern Study of subjects aged 25 were similar; only half the subjects were engaged in predominantly stabilizing career behavior and less than half had actually entered any occupation they had specified as students.

Korn conducted a five-year longitudinal study of a freshman class at Stanford University to determine the nature and consistency of vocational choices. He found that many students chose careers "on some other basis than their measured interests." Findings also suggested that "students are moving on to important career choices without a careful evaluation of what they most want for themselves" (Korn, 1968, p. 230).

In reviewing several studies of the career choice behavior of college students, Katz *et al.* (1969) found two common themes in most findings:

> (1) significant numbers of college students make some shift in career direction between the first year of college and the year following college graduation, and (2) many students appear to move into career choices without adequate evaluation of either personal potential or career alternatives (p. 159).

College students are confronted with a wide variety of occupations from which to choose, are under pressure to make a career choice, become committed to that choice, and prepare to enter an occupation. Two authors (Burck, 1971; and Korn, 1968) have assessed the nature of the problems faced by college students in choosing a career.

Korn has noted that there is a prevailing belief that the student should make his own decisions on a career but because of the great pressure to decide, the individual feels there is no time for critical career exploration. Although the schools and parents prefer to help the student in developing his talents and choosing a satisfying occupation, their primary focus is on helping the student achieve academically. This emphasis on academic achievement often conflicts with the search for a personally meaningful career choice:

> Freshmen arrive at college with widely divergent concepts of themselves, their talents, and their goals. Common to all is the hope of gaining an answer to the question of how to give meaning to their lives, and how to pursue an orderly path through a maze of contradictory pressures. Some students find meaning and order by narrowly defining

> what they want in terms of training for a career. Others are so diffuse in their goals, and have such complex problems of personal meaning to resolve, that their academic work is virtually isolated from their real lives (p. 235).

Burck expressed similar views in reviewing the problems a college student faces. The individual is confronted with a vast array of occupations from which to choose, yet has little knowledge of specific occupations, and little experience in the world of work. He also appears to have little knowledge about himself as a person. Because of this inadequate knowledge and the pressures of the educational system, the student's career choice is "more often made by default than by a deliberate process of selection" (p. 4).

Current Career Counseling Practices

Although the need for career counseling has been demonstrated and theories for facilitating career development have been disseminated, much of present day career counseling is inadequate, according to Borow. He cites seven factors contributing to this inadequacy: (1) the time available for direct career counseling is too limited, (2) there is an overemphasis on specific choice and an underemphasis on the developmental and motivational aspects of planning, (3) many counselors still operate on the one-job-for-life assumptions, (4) testing and test interpretation are overemphasized, (5) the job content of occupations is stressed rather than the psychosocial and life stage characteristics, (6) there is an overemphasis on "crisis counseling" concerning academic and vocational decisions, and (7) there are very few evaluation studies on the outcomes of career counseling.

In reviewing recent developments in the career counseling field, Borow viewed the developments as occurring along three dimensions. These are (1) the aims and scopes of career counseling, (2) new resources and tools for counselors, and (3) career education program concepts. The aims of more recent career counseling approaches include (1) an emphasis on career development and career maturity, (2) promoting occupational awareness and the sense of planfulness in clients rather than on mere choice-making, (3) focus on the process of choice rather than on the act of choice, and (4) an expansion of vocational guidance from the counselor's office throughout the entire curriculum.

A number of new resources and tools are now available to assist the counselor and the student in career counseling. These include multimedia resources, information storage and retrieval systems, interactive computer-assisted exploration programs, self-exploration inventories, and scales of vocational maturity. Examples of the career education program concept include the U.S. Office of Education's career educational model, and programs now implemented in New Jersey, Detroit, Texas, Wyoming, and North Dakota schools. Each of these programs is designed for elementary and secondary school students (Borow, 1973).

The majority of college counseling centers and career planning and placement offices do not employ many innovative approaches in career counseling. In a survey of college counseling centers, Graff and Raque (1974) found that there is a lack of emphasis on career counseling in graduate training programs. Counseling center staffs view career counseling as boring, and practicum students and interns handle more of the career counseling caseload than do staff members with doctorates. Group counseling is the only innovative practice used to any great extent in college counseling centers, and less than 25% of the centers use any audiovisual or computer technology or hold any vocational exploration classes. It would appear from these findings that the majority of college students are not receiving the benefits of recent developments in the career counseling field.

There is also much need for experimentation with new techniques to better facilitate the career decision making of college students. The use of computer-based programs such as SIGI is one of several approaches that is being developed and implemented. Such programs and techniques are the exceptional practices, however, and are in use at only a small number of higher education institutions.

Recommended Approaches to Career Counseling

Several authors have emphasized the personal growth of students that college vocational counselors and placement officers can foster. Sovilla (1972) asserts that "it is rare today for a placement officer to actually place a student." Rather the placement officer today is focusing his efforts on assisting students in defining their career goals, interests, abilities, resources, values, and in relating career goals to overall life goals.

Developmental approaches to career counseling imply that the process should begin early in the student's college career--not during the senior year as the student seeks occupational opportunities. Simpson and Harwood (1973) view the college placement operation as becoming more outward in its thrust and more action-oriented in meeting student needs. They recommend that counselors and placement officers become involved in career-related programs such as work-study, cooperative education, summer employment, volunteer community programs, and independent study projects related to careers.

Katz, one of the principal developers of the SIGI computer-based career guidance program, stressed the importance of values clarification in career guidance. SIGI is based on career value exploration. He maintained that "the choice between vocation, occupation, employment and nonwork is essentially a choice between arrays of values or value systems" (1973, p. 116-117). Values, according to Katz, are distinct from needs and interests since values refer to the "worth of outcomes and results of an activity rather than to the 'functional pleasure' derived from performing activity" (p. 118).

Bolles (1974) suggests that the career counselor should "empower" students rather than merely offering them services. By offering a service, the counselor assists the student out of a crisis situation such as finding a job or deciding on a career. Instead, counselors should use a particular crisis to teach the client how independently to solve a similar problem whenever it may arise later in his life. The difference between offering services and empowering students is expressed in the following analogy: "Give me a fish and I will eat for today; teach me to fish and I will eat for the rest of my life" (p. 26). Bolles believes counselors should become instructors who teach clients how to identify their functional goals, examine previous experiences, and gather their own occupational information. Finally, Bolles contends that "so long as placement and career counseling stays essentially locked into one-to-one relationships between staff and client, there is little realistic hope that it will ever move much beyond merely rendering services" (p. 28).

Johnson (1974) advocates a program of vocational exploration in which students do much of their own self-directed work in the areas of career information and developmental tasks. He too states that learning the task of discovery should be promoted rather than the content itself.

Other approaches to career counseling with college students have been advocated by several authors (Crosz, 1974; Devlin, 1974; Healy, 1974; Kirts and Fisher, 1973; MaGuire, 1972, Simpson and Harwood, 1973; Skovholt and Hoenninger, 1974; and Smith and Evans, 1973), but most seem to agree with Harris-Bowlsbey's (1975) concepts of the necessary components of a good career guidance program. These components include: (1) self-concept clarification, including clarification of interests, values, and abilities; (2) the translation of self-concept to occupational terms; (3) a broad exploration of occupations; (4) teaching of decision making skills; (5) reality testing of tentative choices; (6) making a choice; and (7) implementing choices.

Specific Models in Operation

The majority of new approaches to career counseling emphasize either group counseling techniques or career development academic courses. Few, if any, advocate one-to-one counseling approaches. Comprehensive group programs of career counseling with college students have been developed by Figler (1973), Healy (1974), and Kirts and Fisher (1973).

Figler's "Path Program" is a vocational exploration program designed for liberal arts students in their sophomore and junior years. Figler maintains that the student must participate in his or her own self assessment rather than rely on a vocational test battery, must be given a chance to interact with peers who are facing the same type of decisions, and must be provided with occupational alternatives with which he can make some tentative plans. Students are urged to interview people working in various occupations, list and evaluate past successes and failures, participate in a guided fantasy, review self-assessment, and evaluate occupations.

Healy's group approach is based on Super's theory of career development and consists of five group meetings. This approach is designed to assist the student in accomplishing the following objectives:

> (a) identify what he wants to obtain from working and what he can bring to a career (his means), (b) examine different possibilities from the perspective of his goals and means, (c) select a career possibility appropriate to his goals and means, (d) make plans for entering, or continuing, in the career, (e) begin execution of the plans, and (f) evaluate his progress in order to decide on future action (p. 214).

Kirts and Fisher developed a systems approach to career counseling, "Tripod," which consists of three phases. The first, self-assessment, includes personal interviews, aptitude and interest testing, simulation group exercises, and extensive feedback from counselors and peers. The second phase, exposure, may last up to two years, and during this time students explore broad occupational information, have off-campus field experiences, and attempt to integrate career development with their academic programs. The third phase, typically occurring in the senior year, involves training in job-seeking techniques, interviewing, resume-writing, and evaluation of job opportunities. This program promotes a team approach to career development involving faculty, counseling center staff, and placement personnel. The Tripod program is based on three premises:

> (1) Vocational development is one aspect of an individual's total maturation process of working through personal developmental "crisis points". . .(2) increasing self-knowledge increases the accuracy and adequacy with which a person makes vocational choices. . .and (3) work is a way of life

> and adequate vocational and personal adjustment are most likely to result when both the nature of the work and its consequent way of life are in accord with the needs, aptitudes, interests, values, and goals of the individual (p. 45).

In addition to group counseling programs, an increasing number of higher education institutions are offering career development courses, many for academic credit. In a survey of 1500 institutions, Devlin (1974) discovered that 10% were offering such courses and another 15% were in the planning stages of offering them. Most were taught by placement directors and the majority offered academic credit.

The most popular type of course being offered is the career dynamics course, and the emphasis is on "developing learning skills which will enable the student to gain insight and understanding into the relationship between self and the world of work" (Devlin, p. 64). These courses emphasize the process rather than the content of career decision making.

MaGuire (1972) developed a course consisting of three phases: (1) helping the student gain a better understanding of himself through interest and personality testing, lectures on the psychological and emotional aspects of work, and a student's written self-assessment relating his knowledge of work to his own aspirations; (2) guiding the student in investigating occupational information, including the writing of a monograph on one particular career field and interviewing members of various occupational fields; and (3) aiding the student in integrating his knowledge of himself and of work through studying career development theories and undertaking extensive class projects.

Webb's career development course (1973) is based on a format designed to assist students in answering in sequential order the following questions: Who am I?, Where am I?, What are my resources?, Where am I going?, What is keeping me from getting there?, and What plan of action should be undertaken in order to include information and reality tests?. The course includes administration of vocational test batteries, self-concept exercises, fantasy experiences, test interpretations, feedback sessions, panel discussions with representatives of various occupations, and student interviews with people in several careers.

All of the programs and techniques reviewed above are rather recent developments in the field of career guidance, and are being utilized at a relatively few institutions. Much more experimentation with different approaches such as group counseling, self-directed career exploration, career guidance classes, and computer-based programs must be conducted. The results of the study by Graff and Raque (1974) suggest that the career guidance needs of college students are not adequately being met by traditional approaches. In fulfilling these needs, recent career guidance approaches may offer the same advantages as computer-based programs cited by Harris: They can "add a dimension of student involvement and excitement to self-appraisal, decision-making, vocational exploration, and educational exploration seldom attained in traditional counseling conferences" (Harris, 1970, p. 163).

Research on Career Counseling in Higher Education

In addition to the outcome studies of career counseling approaches utilizing measures of career maturity that will be reviewed in a later section, a number of other research studies of career counseling with college students have been conducted.

Mencke and Cochran (1974) studied the impact of a counseling outreach workshop on the vocational development of college students. The authors constructed a career development attitude scale similar to Crites' instrument and found no changes in attitudes from pretest to posttest. However, students who had participated in the workshop did significantly more information-seeking about careers than did control subjects. Jackson (1971) similarly found no difference on the CMI-Attitude Scale scores between college freshmen who had participated in a group program of career exploration and control subjects. He concluded that scores on the CMI were not related to sex, socio-economic level, or predicted grade point average.

Edwards and Tuckman (1972) studied the effects of attending a community college compared to attending a university on students' self-concept and occupational concepts. They compared a group of entering students at the two institutions and again two years later. Although the study employed no specific counseling approaches, the results of the investigation provide some insight into the effect of attending college for two years. Community college students initially had lower self-esteem scores and identified with lower status occupations than did university students. However, two years later there were no differences in the level of self-esteem and community college liberal arts students identified with higher status occupations and the vocational-technical community college students identified more with their respective occupations.

Two investigations have compared group counseling approaches with individual counseling approaches for college students. Smith and Evans

(1973) compared the effects of the two approaches (group vs. individual) in facilitating career development. They found the five week group counseling approach centered around decision-making strategies to be more effective in facilitating vocational development, with no significant differences between males and females. The authors concluded that "experimental treatments can be designed and implemented which facilitate the vocational development of students" (p. 207). Garrison (1972) also reported that career development counseling over an eight week period assisted college students to affect a change in their self-concept.

Aiken and Johnston (1973) studied the effects of a group reinforcement counseling approach designed to influence the career information-seeking behaviors of college students. They hypothesized that subjects who had high scores on a CMI-Attitude Scale pretest would not be as affected by the counseling approach as subjects who were considered vocationally immature. However, the group counseling approach had an equally positive effect on both vocationally mature and immature subjects.

In an experimental study of community college students, Adams (1974) found that a group career counseling program was more effective than individual counseling or an academic advising-information-giving program in helping entering students maintain higher grade point averages, gain greater satisfaction with the college program, achieve greater certainty about completing their program, and making more appropriate educational-vocational choices.

In another study involving community college students, Anderson and Binnie (1971) investigated the effects of a group vocational counseling program. The program was designed to assist students in examining and exploring their interests and aptitudes as they related to personal aspirations and plans. Over 50% of subjects indicated a different occupational choice on the posttest than they had previously chosen on a pretest. There was also a greater commitment to this new choice. Approximately 25% of the subjects revealed on the posttest that they planned to complete a higher level of education than they had indicated on the pretest, and another fourth planned to complete less education than they had previously indicated.

Wigent (1972, 1974) studied the personality variables related to career decision-making abilities of community college students. He found no differences in the capabilities of freshmen compared to upperclassmen in determining career goals, and no differences between males and females in their degree of certainty about career choices. There was also no relationship between either grade point average or father's educational attainment and the career decision-making abilities. Wigent did conclude, however, that self-concept was related to the problems of career decision making.

Three investigations lend support to the use of programmed counseling rather than traditional individual counseling. Gilbert and Ewing (1971) studied the effects of a programmed counseling program involving the use of a self-directed booklet, and they found that the adequacy of coverage of student problems was superior for programmed counseling compared to "face to face" counseling. The programmed counseling approach also produced more appropriate changes in estimates of ability and interest as they related to the student's chosen field.

A recent investigation (Malacos, 1975) involved a comparison of three techniques to promote career decision making in community college students: (1) traditional one-to-one counseling, (2) programmed self-instruction, and (3) programmed self-instruction accompanied with multimedia material pertaining to factors related to career selection, the world of work, and decision making. A self-report questionnaire measuring the satisfaction with the assistance received and any changes in career preferences was administered as a posttest. Subjects in the programmed instruction-plus-multimedia group made the most changes to a specific career area and rated highest of the three groups on eight of the twelve measures on the self-report questionnaire. "The findings indicate that programmed self-instruction accompanied with multimedia materials is a viable alternative to one-to-one counseling for assisting vocationally undecided community college students who volunteer for counseling" (p. 3).

Finally, Graff, Danish and Austin (1972) compared individual and group approaches with a programmed self-instruction approach to career counseling. They found that subjects in the programmed self-instruction treatment group received significantly more assistance than subjects in the other two groups in three areas: becoming informed of vocational opportunities and requirements; learning how to make educational and vocational decisions; and in establishing career goals consistent with abilities, interests, and personality characteristics. The authors concluded that these findings are an endorsement for self-instruction methods in career counseling: "The results are encouraging enough to suggest that further studies evaluating automated approaches be conducted in more generalized populations and with other criteria variables" (p. 228). They further suggested that much of educational-vocational counseling could be programmed, automated, or otherwise handled more efficiently by mechanical or self-help devices. In the sense that computer-based programs are mechanical and self-help devices, this study provides evidence of the effectiveness of using computers in career guidance.

The Use of Computers in Career Counseling

Of the many methods to facilitate career development reviewed above, the use of computers has been one of the most recent approaches to career guidance. The review of relevant literature pertaining to this approach is divided into the following areas: (1) descriptions and classifications of computer guidance systems, (2) uses of computer programs in counseling, and (3) research studies of computer counseling programs. Following this review is a detailed description of the SIGI program, the method of career guidance on which this investigation is based.

Descriptions and Classification of Computer Guidance Systems

There have been approximately thirty different computer-based guidance information systems designed since the 1960s, and the first computer-assisted guidance program for regular student use was instituted in 1969 (Super, 1973). The capabilities of computer-based programs vary greatly, and these systems have been classified into two major categories, the indirect inquiry system and the direct inquiry system (Harris, 1974).

The majority of computer programs are classified as indirect inquiry systems, and typically operate in the following manner: a student gains information from a computer data base by completing a questionnaire pertaining to such factors as interests, abilities, and personality. These are then batch-processed in a central location. Within a few weeks the student receives a list of schools, programs, or occupations based upon the characteristics he has specified on the questionnaire. Typically the student uses the program only once and is unaware of the exact narrowing of the selection process the computer has incorporated in generating the list of alternatives (Harris, 1974).

The second category, the direct inquiry system, permits the student to have direct communication with the computer by means of a typewriter or cathode-ray tube terminal. This category can be divided into two types of programs. One type is the direct-inquiry-with-monitoring system, and essentially is an information storage, interrelating, and retrieval system. The second type is the direct-inquiry-without-monitoring system. Programs of this variety are designed to interrelate personal data of the student, such as interest test scores, with data about educational and occupational opportunities. It also provides direct feedback to the student, records the paths of exploration and decision making, points out discrepancies, records for future use all interactions with the student, and stimulates a conversation with the student. The user receives immediate feedback, has a high degree of control over the system, is aware of the effects of his choices and options in narrowing ultimate decisions, and usually uses the program more than once (Harris, 1974).

Presently, there are four computer-assisted career guidance programs in the development, testing, or use stages which can be categorized in the direct-inquiry-without-monitoring system. These are: (1) the Computerized Vocational Information System (CVIS), developed at Willowbrook High School in Villa Park, Illinois, by Jo Ann Harris and her staff (Harris, 1970); (2) Education and Career Exploration System (ECES), developed by International Business Machine Corporation and Donald Super and associates (Minor, 1970); (3) Information System for Vocational Decisions (ISVD), developed by David Tiedeman at Harvard University (Tiedeman, 1970); and (4) the System of Interactive Guidance and Information (SIGI), developed by the Educational Testing Service and Martin Katz (Katz, 1973). A fifth program is now in the planning stages, with pilot studies scheduled to begin in September, 1975. This program, to be named DISCOVER, is being sponsored by the United States Office of Education under the direction of Jo Ann Harris-Bowlsbey (Harris-Bowlsbey, 1975).

The CVIS program is based on decision-making theory and is aimed at the high school student. It identifies, evaluates and classifies pertinent data, making it readily available to the student at the appropriate times, and consists of three parts: (1) exploration, i.e. awareness that a decision must be reached; (2) classification, i.e. improving self-understanding about a decision and implementing the decision; and (3) review of decisions, i.e. interrelating the choice with other available information. The ECES program is designed for use with students from junior high school through college freshmen and has three stages also: (1) orientation to the world of work; (2) educational orientation, i.e. relating tentative vocational goals to educational requirements and outlooks; and (3) training and job search, i.e. exploring post-secondary educational and training opportunities, in assisting students with career plans (Bohn and Super, 1969).

The ISVD program is perhaps the most sophisticated of these five programs, allowing the user to respond in natural language and to cause the computer to execute functions not originally programmed into the system. Due to the expense of its terminal equipment and the sophisticated programming and language capabilities, the expense of the ISVD system prohibits its present use, although it is a model for future computer guidance programs (Harris, 1974). SIGI is the only program designed specifically for use with community college students, and because it is being used in the present investigation, a detailed description is presented in a later section.

The DISCOVER program incorporates the capabilities of a computer "light pen" in addition to the typewriter, and is perhaps the most comprehensive career guidance program conceived, having twenty-two different modules (compared to SIGI's six modules). The major components of DISCOVER include (1) understanding my values, (2) learning to make decisions, (3) learning how to group occupations, (4) reviewing my interests and strengths, (5) making a list of occupations to explore, (6) getting information about occupations, (7) narrowing my list of occupations, and (8) making a specific career plan. It is presently being developed for high school students and will not be ready for use until 1976. Variations of the program for use with elementary school students, college students, and adults are scheduled to be developed after the first phase of the system is thoroughly field tested (Harris-Bowlsbey, 1975).

Uses and Benefits of Computer Programs in Counseling

While some observers (Super, 1972, 1973; Harris, 1974) contend that computers will not replace counselors, others (Loughnary and Tondow, 1969) predict that computer technology has advanced to the point that programs can be developed which will make the computer a substitute counselor. Assumptions underlying this prediction include (1) demand for counselor's time is greater than the supply; (2) clients desire confidentiality when discussing personal concerns and often do not wish large group counseling; (3) some counseling functions do not require a great complexity of skills but rather systematic, consistent, and selective use of some simple skills (Loughary and Tondow) and (4) "the disenchantment of a seemingly large number of counselors with vocational and educational guidance procedures" (Loughary, 1970, p. 188).

Harris (1970) suggested that more counselors will be needed as a result of computer-based programs because students will have more information to deal with in making decisions. Students will, however, be making much better informed decisions and "much of the present path-jumping behavior may be avoided." Computers will thus make the information-giver type of counselor obsolete and will relieve the counselor from "clerical and information retrieval functions which now require so much of his time and provide time for more in-depth counseling" (p. 164). Super (1973) described the benefits of using computers in counseling:

> Computers, with their programmed command of a variety of media and with their programmed methods of facilitating inquiry by the user, make possible the individualization of the information dissemination process as only an unusually leisurely, dedicated, and informed counselor can handle it. The computer can inform the inquirer of its capacities for supplying information and it can, within clearly stated limits, supply the information requested--all of the information requested, and only the information requested (p. 293).

The cost of computer-assisted counseling programs may require large outlays for equipment (approximately $75,000 for the hardware for the SIGI program) but the cost per student interaction has been estimated to be between $.75 and $4.00 (Harris-Bowlsbey, 1975) or "the price of a good book" (Super). The major barriers to the widespread adoption of computer-assisted career counseling is not the costs but rather (1) the unfamiliarity with the programs by counselors and schools; (2) the person orientation of the counselors, as contrasted with the technology orientation of computer programs; (3) the "accuracy of the machine compared to the fallability of the human counselor;" (4) the threat to the counselor of the loss of control of his method of work and schedule; and (5) the "apparent deterministic nature of computer-support systems which simulate counseling and the consequent fears of the mechanization of life" (Super, 1973, p. 299).

Research Studies of Guidance Programs

Super, in reviewing outcome studies of computer-assisted counseling programs, reported that research has included: (1) comparing judgements and predictions made by the computer with those made by a human counselor; (2) studying student usage; (3) studying student interactions with others, particularly counselors, after using the computer; (4) studying the student use of other vocational resources after using the computer program; (5) studying the attitudes of students, parents, and counselors toward computer programs; (6) studying the level of vocational maturity of student users; (7) studying the impact of computers on the work of counselors; and (8) studying long term career success and satisfaction of student users.

In one outcome study, Harris (1970) reported that 70% of the students using CVIS had significantly increased their knowledge about occupations. Compared to a control group, a significantly greater percentage of students who had used CVIS believed they knew how to reach vocational decisions. Another study of the effects of the CVIS program (Melhous, Hershenson, and Vermillion, 1973) used standardized tests of personal and academic factors to classify students as either high or low readiness subjects before assigning them to either a computer-assisted counseling program or to a traditional counseling program. While there was no difference among the four treatment groups in their degree of pre-post occupational choice change, the low readiness clients in the computer program were not as satisfied with their counseling experience. The investigators concluded that more individual counseling should be available for low readiness clients and computer services utilized more for high readiness clients. However, human counseling and computer-assisted counseling were determined to be equally effective methods for high readiness clients (Melhous, 1971).

In studying the effects of computer-assisted course selection versus counselor-assisted course selection, Price and Johnson (1973) reported no differences on the following measures: (1) test of understanding of information relevant to course selection, (2) evaluation of completed student programs by five counselors, (3) student reaction to the experience with a computer or with a counselor, and (4) the extent to which students subsequently requested course changes. The authors concluded that:

> Many of the information disseminating tasks that counselors do may be done as effectively by computer programs. The fears expressed by some that students will feel dehumanized when asked to interact with a computer rather than a counselor were not supported in this study. Perhaps when a student's goals, interests, and abilities are recognized and contritute to the decision being made, the student feels that he is being treated as a person, regardless of whether he is interacting with a computer or a human being (p. 330).

The conclusions of this study are supported by Loughary and Tondow (1969) who reported very positive student reaction to their computer-based counseling project. Students particularly felt pleased to express their feelings "without concern of human reaction" and felt that they were "in control of the computer and therefore of the actual counseling situation" (p. 36). The results of another study of computer-mediated career counseling, however, did not reach similar conclusions. In using both computers and counselors to present vocational test results to high school students, Pilato and Myers (1973) concluded that a computer-mediated procedure could not be viewed as a substitute for counselor-mediated test interpretation that was well done.

The Commission on Computer Assisted Guidance Systems of the National Vocational Guidance Association reported that from the experiences of the limited use of computer assisted guidance programs in operation, several general observations could be made: (1) students learn to use the computer systems quickly; (2) programs can effectively assist diverse populations of students "including grades 7-14, all levels of ability and achievement, a variety of socio-economic backgrounds, and students of differing career and educational objectives;" (3) 75% of students report they are better able to make career decisions after using the computer programs; (4) 80% felt they have learned more about themselves and 70% report learning more about occupations; and (5) students report that the computer's greatest assets are speed, ability to assist in discovering new possibilities, ability to present great amounts of information and ability to relate occupations and interests (Harris, 1973, p. 11-12).

Finally a study similar to the present investigation was conducted by Harris (1972). She used Super's Career Development Inventory to assess the effectiveness of the CVIS program in increasing the vocational maturity of high school students. In a pretest-posttest design, it was determined that the CVIS computer program did significantly increase vocational maturity, specifically in the areas of awareness of need to plan and knowledge of resources for exploration. The program also increased the accuracy and range of information which students had about chosen occupations.

The System for Interactive Guidance and Information (SIGI)

A student interacts with the SIGI system via a cathode-ray tube terminal consisting of a television-like screen and a set of response keys similar to a typewriter keyboard. Messages are presented on the screen and the student responds to a question or asks a question by pressing designated keys, all in a multiple-choice format. The screen provides information to the student, provides choices of what to do next, and according to E.T.S.:

> Sometimes it serves as a spokesman for the student, who may try out and modify various expressions of his or her own values, specifications of minimum requirements, and occupational goals and plans. . .It instructs them in the rules and possibilities of the decision-making process, but allows them to make the decisions for themselves (Educational Testing Service, 1974, p. 4).

There are six major subsystems of SIGI: Values, Locate, Compare, Prediction, Planning, and Strategy. The entire system is based upon the concept of one's values, since values "provide the dimensions along which students analyze their own desires and along which they construe occupational characteristics" (Chapman, Norris, and Katz, 1973, p. 6-6).

In the first subsystem, Values, a series of ten occupational values are operationally defined by SIGI and a student weighs each value according to its importance to him. These values are high income, prestige, independence, helping others, security, variety, leadership, interest field, leisure, and early entry. Secondly, the student is confronted with a series of values dilemmas and must choose between hypothetical occupations representing a pure manifestation of each value. After several rounds of this game, SIGI points out any inconsistencies between the student's previous weighting of values and his preferences indicated during the games. The student is then given the opportunity to readjust his weighting for each value and finally is asked to distribute forty points among the ten values. This becomes a profile of the student's "examined values."

Locate, the second subsystem, allows the student to indicate specification on any five values at a time. E.T.S. explains the process thus:

> The specifications represent the minimum amount of kind of satisfaction that is acceptable in respect to any value. The computer uses these specifications to sift the occupational data and instantly display on the screen a list of occupations that meet or exceed the specifications. . .The student can change the specifications and can substitute other values, to generate additional lists of occupations that are worthy of further consideration (p. 7).

In Compare, the student can ask specific questions about any three occupations at a time. The twenty-eight possible questions cover such topics as work activities, entry requirements, income, personal satisfactions, conditions of work, and outlook. The answers to these questions are brought up to date every six months.

Prediction, the fourth subsystem, is designed to assist the student in judging his or her chances of success in various courses and programs dealing with particular occupations offered by the college. Various measures of the students' academic ability such as entrance test scores, high school grades, aptitude or achievement tests, and previous college grades, are stored in the computer. The grades which students with similar abilities have earned in particular courses are also stored, and SIGI integrates this information in assisting the student to judge his chances of earning a particular grade in any course. The Prediction subsystem is thus based entirely on the local college norms.

This subsystem is being altered for use at Santa Fe Community College. A student's self-estimate of grades in a particular course rather than actual test scores will be used for this prediction. Until more validity data are gathered on this method of prediction, however, the subsystem Prediction will not be operational at Santa Fe and thus will not be part of the treatment process of this investigation.

Planning is the fifth subsystem. It assists students in making plans for entering any of the approximately 250 occupations considered in SIGI:

> They /students/ are shown the requirements for entry and judge whether they are willing and able to meet them. If they are undecided, they see displays of the rewards and risks of trying the program for that occupation for a semester or switch to another program. They can then see an overview of a complete plan for entering the occupation, followed by a specific semester-by-semester course of studies recommended at their own college. If transfer is required, students get information about colleges in the region that offer a major appropriate program for the occupation they are considering. They can also summon up extensive information about financial aid (Educational Testing Service, 1974, p. 8-9).

Strategy is the final subsystem and brings together the student's values, occupational information, and prediction for three occupations at a time. The student is shown the weights he had previously assigned to each value and is given the chance to revise these weights to show the current importance of each value. This last step of SIGI is described by E.T.S.:

> The weight for each value (showing its importance to the student) is multiplied by the rating (the degree of opportunity offered by the occupation); the sum of these products for each occupation provides an index of its overall desirability of success in entering the occupation. Students scan the steps necessary for entry and estimate these probabilities. Finally, they examine their choices in the light of the relative risks and rewards. . .Thus students evaluate their choices and explore alternative strategies for choice (p. 9).

The SIGI program is written in eighth grade language, and the student may ask for a printout of any information which appears on the screen by pressing the "print" key. All "conversations" with the student are stored in the computer so the student may terminate or begin a particular session at any point in the program. The student may move freely within the SIGI system and use any of the subsystems as he sees fit, as many times as he chooses, and essentially in whatever order he chooses; the student is in full control of the sessions.

The length of time required to complete the SIGI program varies greatly, depending on the number of times a student re-examines his values, the number of occupations he considers and the number of questions he asks. The amount of time ranges from 1½ to 6 hours, with the average time approximately 3-4 hours. At Santa Fe Community College, sessions are scheduled for two-hour time blocks.

Upon completing the six subsystems of SIGI, the student may choose to see a counselor for further assistance; but SIGI does not depend upon face to face counseling and routine counselor assistance is not considered to be an essential aspect of the SIGI program by E.T.S.:

> Although SIGI may prove to be self-sufficient for a certain portion of the counselor's students, our limited experience shows that for many others it opens up new avenues of thought, new insights, new speculations that cannot be resolved by an unaided computer program. . .The hope is that SIGI will cause students in this category to appear in the counselor's office with their problems more or less explicitly defined (Chapman, 1973, p. 1).

Outcome Research on SIGI

Previous to the present field testing, SIGI was used in one pilot study of sixty-one community college students; and this has been the only research conducted in SIGI in actual operation (Chapman, 1973). A stratified random sampling procedure was employed to select subjects, who were matched on the basis of sex, academic program, placement scores, and reading and mathematics scores. Subjects were then divided into control and experimental groups, and the experimental subjects were exposed to the SIGI program. The posttest consisted of a written information test on specific occupations and a structured interview designed to assess rational decision making skills. The graded interviews encompassed the following areas: (1) the number of occupational value constructs the subject could volunteer, (2) the nature and extent of the subject's planning, and (3) the amount of information the subject possessed about a preferred occupation.

It was hypothesized that experimental subjects would be more aware of the elements that contribute to a rational decision making process than would control subjects. The mean scores of experimental subjects exceeded those of control subjects for each of the three parts of the interview rating scale, but the differences between the groups reached significance only on the planning scores. The researchers concluded that "the two groups are significantly different with respect to the final element (planning) of the decision making process, but the differences do not reach significance with respect to the acquisition of information and the formulation of occupational constructs" (Chapman *et al*., 1973, p. 182).

The researchers noted that these findings were consistent with observations that a student appeared to use SIGI according to his own style or needs. They interpreted these findings thus:

> SIGI was designed to encourage experimentation and to accommodate a great variety of behaviors. Our expectation was, however, that regardless of how distinctive a student might be in his approach, he would learn all the elements of a logical decision making sequence by going through it. The steps in this sequence are defined by the path described for the novice: (1) the determination of his values, (2) the location of opportunities for realizing those values, (3) the collection of information about those opportunities, and (4) the formulation of plans that combine an acceptable risk with an acceptable reward. Although students successfully fabricate a logical decision making procedure at the terminal, where all the elements of such a procedure are in full view, they do not transfer the procedure to the context of the interview, where the elements are no longer visible.
>
> It seems probable that the tendency of many students to select one of the systems for heavy use, subordinating the others, accounts for their failure to transfer all elements of the decision making process. It is conjectured that the heavy users of VALUES and LOCATE account for the difference in mean between the experimentals and controls with respect to Constructs, and the heavy users of INFORMATION account for the difference in the Information Test. Other users would show no difference. The number of such heavy users in any one system, however, is too small to cause a significant difference between the groups as a whole (p. 183).

Although the outcome of the SIGI program, as measured by the above instruments, may appear to be disappointing, students did evaluate their experiences quite positively, reporting that it was easy to understand, was interesting, assisted them in becoming more aware of their values, and was fully adequate for their needs. The primary purpose of the pilot research was to study students' behavior as they interacted with the terminal. Whether or not SIGI facilitates the career decision making process or the career maturity of students is yet to be determined. Obviously there is a need for much more outcome research on the SIGI program. The present investigation is designed to assess one outcome variable of SIGI, that of increasing career maturity. The Career Maturity Inventory will be employed to assess this outcome, and a detailed review of the instrument and related research is presented below.

The Career Maturity Inventory

The Career Maturity Inventory (CMI), constructed by John Crites, has been used in over 200 studies. Written at the sixth grade reading level, it is applicable for use with individuals from elementary school through the senior year in college. The CMI, as previously mentioned, is composed of two distinct scales, the CMI Attitude Scale and the CMI Competence Test. Because each scale has been used independently and supporting research has been conducted separately for each scale, each is reviewed separately below.

The CMI Attitude Scale

The Attitude Scale is a self-report instrument designed to elicit "the feelings, the subjective reactions, the dispositions that the individual has toward making a career choice and entering the world of work" (Crites, 1973a, p. 3). It specifically measures attitudes toward vocational choice on the following five dimensions: involvement in the choice process, orientation toward work, independence in decision making, preference for career choice factors, and conceptions of the choice process. The Attitude Scale is composed of fifty true-false statements, each expressing a thought about careers or career choice. It requires approximately twenty minutes to complete. Although the Attitude Scale theoretically includes the five dimensions listed above, it yields only one raw score, the number of items correctly answered. The principal usefulness of the Attitude Scale, according to Crites, is "in screening individuals for counseling and in evaluating the outcomes of career education and other didactic programs and interventive experiences" (1973b, p. 11).

Validity, Reliability, and Use of the CMI-Attitude Scale

The reliability of the Attitude Scale was determined by the internal consistency method and the test-retest method. Internal consistency coefficients of .74 were determined by the Kuder Richardson formula. These coefficients are comparable to other instruments similar to the Attitude Scale and are consistent with theoretical expectation since the instrument was designed to measure related but not identical measures of vocational attitudes (Crites, 1973b, p. 14).

A test-retest reliability coefficient of .71 was reported for 1,648 subjects in grades 6-12 over a one year period. This level of reliability coefficient is acceptable, according to Crites: "An extremely high stability coefficient for the Attitude Scale over long periods would be contrary to the theoretical proposition that vocational behavior matures with time" (p. 14).

Content validity was demonstrated through the procedure employed in selecting items and through the judgement of ten experts, whose opinions reached a 74 percent level of agreement with the scoring key. Criterion-related validity was established through a correlation study of the CMI and the Readiness for Vocational Planning Scale. A correlation coefficient of .38 ($p<.01$) was reported for these two instruments. Another study, cited as evidence of the criterion validity, reported a biserial r of .25 between the CMI and subjects' decisions about a career (Crites, 1973b).

The CMI was found to be correlated with several indices of educational and personal adjustment, but non-significant correlations with socio-economic status and previous work experience have been found, according to Crites. From these data he concludes:

> To the extent that a hypothetical relationship between career maturity and personality makes theoretical sense, studies correlating the Attitude Scale with several personality variables support its construct validity (1973b, p. 18).

No national norms exist for the CMI Attitude Scale since "the most appropriate reference group for an individual is the one he most resembles demographically and educationally" (Crites, 1973a, p. 13). In using local norms, however, the primary consideration is to "determine an individual's rate of career development in comparison to grademates" (Crites, 1973a, p. 13). In samples of college freshmen in three different states, means of 39.77, 38.86, and 39.29 were reported, and scores ranged from 26 to 47, with standard deviations of 4.11, 4.21, and 6.01, respectively (Crites, p. 47).

The CMI Attitude Scale has been used perhaps most extensively with elementary and secondary school subjects, but several studies (Aiken and Johnston, 1973; Jackson, 1971; Walsh, Howard, O'Brien, Santa-Maria, and Edmundson, 1973; Walsh and Osipow, 1973) have demonstrated its utility in assessing the career maturity of college students. Large scale testing of college students has also indicated that "there is sufficient ceiling on the Attitude Scale to administer it to college sophomores and juniors and even selected seniors, primarily those who are still undecided about their careers" (Crites, 1973a, p. 5).

Walsh and Osipow used the Attitude Scale to assess the vocational maturity of students enrolled in academic major consistent with their vocational preferences, as measured by Holland's Vocational Preference Inventory. The authors reported means of 38.63 (S.D.=7.84) for males and 37.93 (S.D.=7.64) for females. Means of 36.78 for males and 36.81 for females were reported for subjects undecided about an academic major. There were 162 subjects in the investigation. Positive relationships existed between CMI scales and (1) educational achievement, (2) indecision and unrealism in vocational choice, and (3) various personality characteristics. The authors did not specify which personality characteristics were studied.

In a very similar study conducted by the same senior author with 140 freshmen psychology students, Walsh _et al_. (1973) reported means of 40.11 for males and 40.14 for females whose major was congruent with measured vocational preferences. Subjects whose majors were termed "incongruent" had mean scores on the CMI of 38.77 (males) and 39.43 (females). Standard deviations in this study were similar to those in the earlier research.

Research Using the CMI-Attitude Scale for Assessment

The CMI Attitude Scale was used to assess the effectiveness of a formal program of career exploration on the vocational maturity of college freshmen, but no significant differences were found between experimental and control subjects on the posttest. Scores on the CMI were not related to sex, socio-economic status or predicted GPA (Jackson).

Aiken and Johnston used the CMI to classify 94 male freshmen and sophomores as career mature or immature. All subjects then participated in group reinforcement counseling designed to influence their career information-seeking behaviors. The authors hypothesized that vocationally mature subjects would not show an increase in career information-seeking responses since they theoretically already knew what they should in order to discover suitable occupations. Both vocationally mature and immature subjects increased their exploratory behavior during treatment, however, and the hypothesis was rejected.

In studies using the Attitude Scale with high school students, it was found to be positively correlated with self concept (Putnam and Hansen, 1972) and with the Readiness for Career Planning Scale (Hansen and Ansell, 1973). The CMI was used to assess the effects of a "short-term" career counseling program on the career maturity of high school students, and it was concluded that "short-term career counseling does facilitate career maturity of 10th grade students as measured by the CMI" (Flake, Roach, and Stenning, 1975, p. 72).

In reviewing studies designed to measure the effectiveness of various counseling approaches in assisting the career development of high school students, Cross (1975) reported that no significant differences were found between experimental and control subjects' CMI scores in several investigations. However, Crites reported that a number of researchers had found that counseled students had higher posttest scores on the CMI than non-counseled students and further stated that "the best conclusion which can be drawn at present is that counseling evidently can affect Attitude Scale scores favorably but it is not known why" (Crites, 1973b, p. 20).

The CMI-Attitude Scale has been used extensively by many researchers to measure career maturity and to assess the effectiveness of several career counseling and intervention programs. A test review concludes that "Crites gave careful attention to traditional conventions of test-making, i.e., problems of internal consistency, response bias, etc." and "The work of Crites clearly constitutes a significant contribution to this field" (Sorenson, 1974, p. 55-56). Finally, Westbrook and Cunningham (1970), in their review of vocational maturity measures, state:

> An instrument intended for the measurement of developmental variables such as vocational maturity must yield scores which either increase or decrease with age. The Attitude Inventory developed by Crites is perhaps the only instrument which has been demonstrated empirically to be correlated with chronological age (p. 173).

The CMI Competence Test

The Competence Test is the second instrument of the Career Maturity Inventory. It "measures the more cognitive variables involved in choosing an occupation," including: (1) how well an individual can assess his strengths and weaknesses as related to occupations, (2) how much the individual knows about vocations, (3) how skillful the individual is in matching personal characteristics with occupational requirements, (4) how much foresight the individual has in planning for a career, and (5) how effective the individual is in coping with problems arising in the course of career development (Crites, 1973a). The Competence Test is composed of five separate subscales, each designed to measure one of the five variables listed above. They are: Part 1: Knowing Yourself (self-appraisal); Part 2: Knowing About Jobs (occupational information); Part 3: Choosing a Job (goal selection); Part 4: Looking Ahead (planning); and Part 5: What Should They Do? (problem solving). Each subscale consists of twenty multiple-choice items and yields a separate score. It requires approximately twenty minutes to complete each scale, or a total of approximately 1½ hours for the entire Competence Test.

Although the Competence Test was constructed at the same time as the Attitude Scale, comparatively little research has been conducted on it, and it can best be described as still being in an early stage of development (Crites, 1973b, p. 35). The reliability of the Competence Test has been determined only through the internal consistency method, with Kuder-Richardson coefficients ranging from .72 to .90. These are taken as an indication that "all five parts of the Competence Test are relatively homogenious sets of items and, therefore, it can be assumed that within a subtest the items measure essentially the same variable" (Crites, 1973b, p. 33). Validity studies on the Competence Test are not completed, although the use of the rational-empirical test methodology used in constructing it would indicate it does possess content validity, according to Crites.

Although the competence test is still considered to be in the early stage of development, three of the subscales have been chosen to be used in the present study because they have been designed to assess the cognitive domains of what SIGI purportedly teaches students. These are the self appraisal, occupational information, and goal selection subscales. The last two subscales were not used for two reasons: (1) their content is not as relevant to the SIGI program, and (2) the total time required to administer the entire CMI, including the Attitude Scale and all five subscales of the Competence Test is 2½ hours.

Such a time requirement would place unreasonable demands on subjects for the investigation.

Descriptions of the Subscales

Crites (1973b, pp. 23-27) provides descriptions and rationales for the content of the three subscales of the CMI-Competence Test which are being used in the present study:

1. Self-Appraisal (Part 1: Knowing Yourself) is designed to measure the variable of self-concept in the process of career decision making. A central concept in career development theory is that in choosing an occupation, one is essentially choosing a means to implement his self-concept. It is expected that the vocationally mature individuals will have thought more about their vocational assets and liabilities and will have greater self-knowledge. This subscale is based upon the assumption that individuals who can accurately appraise the capabilities of others as they relate to careers are good self-appraisers.

2. Occupational Information (Part 2: Knowing About Jobs) is designed to measure the variable of career maturity competence dealing with knowledge of careers, a critical component of career decision making. The "accuracy and extent of job knowledge should differentiate the more from the less vocationally mature" (Crites, 1964, p. 329).

3. Goal Selection (Part 3: Choosing a Job) was constructed to measure the component of selecting goals which are consistent with one's abilities, interests, and values, i.e., the ability of relating self to the world of work. According to Crites:

> The more vocationally mature person not only has greater knowledge about self and work but relates one to the other.

> He has thought about how his capabilities relate to the demands and requirements of jobs. He attempts to "bridge the gap" between himself and the world of work, to achieve a "synthesis," as Super (1957) puts it, of the major factors involved in vocational choice (1964, p. 329).

During the past twenty years a number of theories of career development have been proposed, and examples of these have been reviewed. One aspect of these theories is the concept of career maturity. Indices of career maturity as well as instruments designed to measure career maturity have been surveyed.

While the findings of previous research have been mixed, there are indications that an individual's career development, as measured by his level of career maturity, can be facilitated through a variety of intervention techniques. A number of these techniques which have been constructed and utilized with college students were also reviewed, followed by examples of outcome research on these techniques. Current literature indicates that a recent yet increasingly utilized method of evaluating a particular approach to career guidance is to determine its effectiveness in increasing clients' career maturity.

Literature related to one of the most recent approaches to career counseling, the use of computer-based career exploration programs, was subsequently reviewed. While comparatively little research has been conducted on the outcomes of such intervention programs, there are indications that computer-assisted counseling programs can facilitate career maturity. The majority of studies, however, have been conducted on computer-based systems used with high school students. A description of the only computer-based program designed for use with community college students, SIGI, was presented. Because the development of this system has only recently been completed, no research, to the author's knowledge, has been conducted to determine SIGI's effectiveness in facilitating the career maturity of students.

Finally, the Career Maturity Inventory, the principal instrument used in this investigation, was discussed. Research on the CMI has illustrated its utility in assessing not only career maturity but the effects of intervention programs on a client's career development. Studies have also shown that career maturity can be increased in a relatively short four week period.

The review of related literature has several implications for this study. Facilitating career development has become the primary goal of career guidance programs. The effectiveness of a particular intervention program or technique in meeting this goal can be assessed by determining its effect on clients' career maturity, and the Career Maturity Inventory has been utilized in many studies for this purpose.

Several career guidance programs have proved effective in raising career maturity. Although little outcome research of this nature has been conducted on computer-based programs, there is evidence that these intervention programs can also have an impact on the career maturity of users. The question of whether SIGI is such a program remains to be answered, and the present investigation is designed to answer, in part, that question.

CHAPTER III

RESEARCH METHODOLOGY

To determine the effects of the SIGI program on the career maturity of community college students, an experimental research design was employed. Basically, the Career Maturity Inventory (CMI) was administered as a pretest to a sample of students before they participated in the SIGI program, which was the treatment aspect of this investigation. Following the treatment, the CMI was again administered as the posttest. If there is a significant increase in the scores on the CMI from pretest to the posttest, it can be concluded that the SIGI program did facilitate students in reaching higher levels of career maturity.

The effects of SIGI on a student's consistency of academic and occupational choices was also studied, as well as SIGI's effect on the student's commitment to those choices. These effects were examined through the use of a short questionnaire administered as part of the pretest (Appendix A) and the posttest (Appendix B). Finally, the relationship between SIGI and the variables of sex and type of academic program in which enrolled was examined through the use of the pretest questionnaire.

In order to control for extraneous influences on the posttest, a total of four different groups of subjects was studied. This Randomized-Solomon-Four-Group Design, in which each group receives a different combination of testing and/or treatment, controls for the influence of the pretest on the experimental treatment, and allows for a comparison of experimental and control groups. Group I was given (1) the pretest, (2) the treatment (SIGI), and (3) the posttest; Group II had the pretest and posttest but no treatment. Group III only participated in the treatment and posttest phases of the study, and Group IV was only given the posttest.

The remainder of this chapter is devoted to a more detailed explanation of the research methodology briefly described above: (1) the experimental hypotheses, (2) the population, (3) the selection of subjects, (4) the experimental design, (5) the pretest instrument, (6) the treatment process, (7) the posttest instrument, (8) the collection of data, (9) the analysis of data, and (10) the limitations of the study.

The Hypotheses

This research focused on fourteen hypotheses related to the effect of the SIGI program on the career maturity of community college students. The following null hypotheses were tested:

$H_0 1$: There will be no significant difference in the career choice attitudes, as measured by the CMI-Attitude Scale, between subjects who have participated in the SIGI program and the control subjects.

$H_0 2$: There will be no significant difference in the self appraisal career competence, as measured by the CMI-Competence Test Part 1, between subjects who have participated in the SIGI program and the control subjects.

$H_0 3$: There will be no significant difference in the level of occupational information, as measured by the CMI Competence Test Part 2, between subjects who have participated in the SIGI program and the control subjects.

$H_0 4$: There will be no significant difference in the goal selection career choice competency, as measured by the CMI Competence Test Part 3, between subjects who have participated in the SIGI program and the control subjects.

$H_0 5$: There will be no significant difference in the ability to state a choice of an occupation, as measured by the posttest career information questionnaire, between subjects who have participated in the SIGI program and the control subjects.

$H_0 6$: There will be no significant difference in the degree of commitment to an occupational choice, as measured by the posttest career information questionnaire, between subjects who have participated in the SIGI program and the control subjects.

$H_0 7$: There will be no significant difference in the ability to state an academic major, as measured by the posttest career information questionnaire, between subjects who have participated in the SIGI program and control subjects.

$H_0 8$: There will be no significant difference in the degree of commitment to an academic major, as measured by the posttest career information questionnaire, between subjects who have participated in the SIGI program and control subjects.

$H_0 9$: There will be no significant difference in the pretest-posttest gain scores of subjects who have participated in the SIGI program and the pretest-posttest gain scores of the control subjects on the following measures:

(a) CMI-Attitude Scale

(b) CMI Competence Test Part 1

(c) CMI Competence Test Part 2

(d) CMI Competence Test Part 3

$H_0 10$: There will be no significant differences between the scores of males who have participated in the SIGI program and the scores of females who have participated in the SIGI program on the following measures:

(a) CMI-Attitude Scale

(b) CMI Competence Test Part 1

(c) CMI Competence Test Part 2

(d) CMI Competence Test Part 3

$H_0 11$: There will be no significant difference between males and females who have participated in the SIGI program on the following variables:

(a) Their decision on an academic major

(b) Their degree of commitment to the decision on a major

(c) Their decision on an occupation

(d) Their degree of commitment to the decision on the occupation.

$H_0$12: There will be no significant differences in the scores of subjects enrolled in the Associate of Arts Program, the Associate of Science Program, or a Certificate Program who have participated in SIGI on the following measures:

(a) CMI-Attitude Scale

(b) CMI Competence Test Part I

(c) CMI Competence Test Part 2

(d) CMI Competence Test Part 3

$H_0$13: There will be no significant differences between subjects in the Associate of Arts Program and the Associate of Science Program who have participated in the SIGI program on the following measures:

(a) Their decision on an academic major

(b) Their degree of commitment to the decision on a major

(c) Their decision on an occupation

(d) Their degree of commitment to the decision on an occupation.

$H_0$14: There will be no significant interaction effects between the pretest and the SIGI treatment.

Population

The population investigated consisted of full-time students at Santa Fe Community College, Gainesville, Florida, who were enrolled in the course, "The Individual and the Changing Environment." This course (BE 100) is a college requirement for any student pursuing the Associate of Arts degree (the university-parallel or transfer program). Students enrolled in the vocational-technical programs (Associate of Science Degree) or in certificate programs are strongly encouraged to enroll in BE 100, although it is not required.

Because BE 100 is taken by a greater percentage of students at Santa Fe Community College than any other course, the population of this course more closely parallels the population of the student body than any other courses offered. The focus of BE 100 is on each student's personal development, including career development. There are approximately 40-50 sections of BE 100 offered each quarter, with 18 students in each section.

Selection of the Subjects

Subjects for this investigation were students enrolled in ten of the sections of BE 100 during the Spring Quarter, 1975, who expressed a desire to receive assistance in choosing a career. Four instructors, each of whom taught multiple sections of the course, participated in the study. Each informed his or her classes of the SIGI program and of this investigation, encouraging students to participate in the project. Out of the some 165 students in these sections, it was expected that approximately 140 students would seek this assistance. The names of students who volunteered were recorded by the instructors, and these students became subjects for the study.

Subjects were randomly placed in one of the four research groups by assigning every fourth student from the list generated by the instructors. The pretest was administered to subjects in the pretesting groups and appointments were made for subjects scheduled to use SIGI.

After all subjects in Groups I and III completed the SIGI program, which was expected to take from 4-5 weeks, the posttest was administered. Subjects who had not completed SIGI in three weeks were contacted and encouraged to do so.

The Research Design

A Randomized-Solomon-Four-Group experimental design (Campbell and Stanley, 1966) was used to test the hypotheses. This design permits the control and measurement of both the main effects of pretesting and the interaction effects of the pretest and the experimental treatment (Isaac and Michael, 1971). It provides control over all sources jeopardizing the internal validity of the study: history, maturation, pretesting, measuring instruments, experimental mortality, and the interaction of selection and maturation. The threat to external validity posed by the interaction of pretesting and treatment is also controlled in this experimental design, thus permitting the results to be generalized to a greater degree of confidence.

The Solomon experimental design consists of four groups of subjects, each receiving a different combination of treatment and testing and is graphically described thus (Isaac and Michael, p. 41):

	Group	Pretest	Treatment	Posttest
I.	Pretested	T_1	X	T_2
II.	Pretested	T_1	.	T_2
III.	Unpretested	.	X	T_2
IV.	Unpretested	.	.	T_2

The Pretest

The pretest consisted of five instruments: (1) CMI-Attitude Scale, (2) CMI Competence Test Part 1--Knowing Yourself, (3) CMI Competence Test Part 2--Knowing About Jobs, (4) CMI Competence Test Part 3--Choosing a Job, and (5) a career information questionnaire designed by the author. Detailed descriptions of the first four instruments appear in Chapter II. The career information questionnaire solicited the following information: name, sex, type of academic program in which enrolled (Associate of Arts, Associate of Science, or Certificate Program), decisions relative to academic major and occupation, and degree of commitment to these choices. Total time for administration of the entire pretest was approximately 1½ hours.

Subjects in groups I and II completed the entire pretest, and those in groups III and IV completed only the career information questionnaire. Subjects were assured that all information provided would be kept confidential, and the only purpose for requesting their names was to identify the tests for purposes of providing test interpretation at the completion of the experiment to individuals who desired it and to insure that subjects in groups I and III assigned to use SIGI had actually completed the program.

The Experimental Treatment

Subjects assigned to groups I and III were given first priority among Santa Fe students to use SIGI during the five weeks of the experiment. They could use SIGI for two-hour time periods and could continue to make as many two-hour appointments as necessary to complete the entire program. The average time required for completion was approximately 3-4 hours. Before using one of the four SIGI terminals available, each subject was given a short briefing session by the SIGI operator who explained the purpose and use of the program.

No other form of career guidance was provided to any subject in either the experimental or control groups as part of the experiment. However, subjects were not denied the opportunity of seeking further assistance on their own. The BE 100 instructors participating in this study did not discuss career development problems in their classes during the duration of the experiment. Subjects in all groups were asked to indicate if they had received any career counseling during the course of the experiment.

The SIGI program is designed to permit a student to use the various subsystems in any order and for any length of time desired. However, before the student is able to return to any subsystem, he must first complete the subsystems in sequential order. The student may use SIGI several times throughout his college career to re-examine his vocational value structure and to explore different occupational areas. The SIGI operators monitor a student's progress through the program, routinely recording the names of students who have progressed through the Strategy subsystem. These students are then requested to complete a questionnaire, evaluating their experience with SIGI as part of the field test project. For the purpose of this investigation, the criteria for completing the SIGI treatment consisted of the subject completing the last subsystem of SIGI.

The Posttest

The posttest consisted of the four scales of the CMI and a career information questionnaire (Appendix B). In addition to the identical four questions asked in the pretest about academic and occupational decisions, the questionnaire consisted of items pertaining to amount of employment and educational experience. The posttest was administered to subjects in all four groups during BE 100 class meetings during the fifth week following the date of the pretest administration. The purpose of the study and an explanation of the instruments were given to all subjects, and each subject was given the opportunity to have his CMI Profile interpreted by the BE 100 instructor.

Collection of Data

The data for this investigation were collected in the following sequential order:

1. BE 100 instructors explained the SIGI program to their classes and recorded the names of students interested in receiving assistance in choosing a career. These were the subjects for the study.
2. Subjects were randomly assigned to one of the four groups described in the experimental design.
3. Subjects in groups I and II were administered the entire pretest. Those in group I were also given appointment times to use SIGI, and subjects in group II were informed that they could schedule appointments in approximately four weeks.
4. Subjects in groups III and IV were administered only the questionnaire part of the pretest. Those in group III were given appointment times to use SIGI, and subjects in group IV were informed that they could schedule appointments in approximately four weeks.
5. The pretest instruments administered to groups I and II were scored and each subject's raw scores were recorded. During this period, subjects in groups I and III were completing the SIGI program.
6. All subjects were given the posttest during the fifth week following the date of the pretest.
7. Subjects in groups II and IV were given the opportunity to schedule an appointment to use SIGI.
8. Posttest instruments were scored, and each subject's raw scores were recorded and matched with his or her scores on the pretest.
9. All subjects were given the opportunity of having their CMI profiles interpreted by the BE 100 instructors.

Analysis of the Data

Raw scores (the number of correct responses) for the four scales of the CMI and responses to the items in the questionnaire were used for analysis. The range of possible scores is 0-50 on the Attitude Scale and 0-20 on each of the three scales of the Competence Test. A higher score indicates greater vocational maturity. Items on the career information questionnaire pertaining to decisions on an academic major and on an occupation were scored as a "1" for a "yes" response and as "2" for a "no" response. Items pertaining to the degree of commitment to each of these choices were scored from one to three, with "3" indicating the least degree of commitment. The variable of sex was scored as a "1" for male and as a "2" for female. The variable of academic program was scored as a "1" for Associate of Arts program, "2" for Associate of Science program, and "3" for a certificate program.

The null hypotheses $H_0 1$ through $H_0 4$ were tested by comparing the posttest scores of the four groups of subjects, using a one way analysis of variance design. A confidence level of .05 was used to determine significant differences. If a significant F ratio was calculated, a multiple comparison test was used to determine where these differences lie.

Null hypotheses $H_0 5$ through $H_0 8$ were tested by comparing the posttest scores of subjects by groups using a chi square analysis. A .05 level of confidence was established to determine significant differences.

Null hypothesis $H_0 9$ was tested in the following manner: the pretest scores were compared with the posttest scores for all subjects in groups I and II using a t-test. A correlation of each group's pretest and posttest scores was also calculated to determine the consistency of change. Null hypothesis $H_0 10$ was tested by comparing the posttest scores of all males in group I with the posttest scores of all females in group I, using a t-test to determine significant differences on the CMI scales and a chi square analysis to determine significant differences on the questionnaire. The same procedure was used for subjects in group III.

Null hypothesis $H_0 11$ was tested by comparing the posttest scores of all Associate of Arts subjects in group I with all Associate of Science subjects in group I. A t-test was used to determine significant differences on the CMI scales and a chi square analysis was used to determine significant differences on the questionnaire. The same procedure was used for subjects in group III. Null hypothesis $H_0 12$ was tested by comparing the posttest scores of groups I and II, using a t-test.

Limitations of the Study

One of the possible limitations of the research concerns the nature of controls in the treatment process. There is no method of controlling either the length of time the subject interacts with SIGI nor the depth of the interaction with one or more of the subsystems. Thus, one subject may move swiftly, and perhaps superficially, through the program to reach the final subsystem. Another subject, after reaching the strategy subsystem, may spend considerable time interacting with various subsystems before informing the SIGI operator that he has completed the program. Additionally, there is no ethical means of prohibiting a subject from receiving additional personal vocational counseling during the time period of this investigation. Thus, experimental subjects may be receiving varying amounts of career guidance between the pretest and posttest. In order to keep the experimental treatment as similar as possible to the actual conditions under which students would normally use SIGI, these factors were not controlled.

A second possible limitation is the inclusion of an instrument, the CMI Competence Test, which has not been used extensively in previous research, and on which there has been collected little validity or reliability data. It was selected, however, because it appears to be the only available objective instrument that theoretically measures competencies which SIGI is designed to teach.

A third possible limitation concerns the length of time between the pretest and posttest, particularly as this pertains to the measurement of attitude change. Some observers may contend that a four to six week interval is an insufficient length of time in which attitude change can occur in any significant manner. The CMI Attitude Scale, however, contains some cognitively based elements, and previous studies cited in Chapter II have reported significant changes on the Attitude Scale over a four-week period.

A fourth limitation pertains to the data analysis. Data related to the primary purpose of the study, i.e., the effects of SIGI on a subject's career maturity, were analyzed. A descriptive study of the relationships of the different demographic variables may prove to be valuable, but these data were not analyzed because it is beyond the practical limits of this investigation. The sheer length of interpretation of the additional data such an analysis would yield could easily diminish the focus of the primary question this experimental study is designed to answer.

CHAPTER IV

THE FINDINGS

The experimental design described in Chapter III was used to test the fourteen null hypotheses, and the data were analyzed according to the procedures previously described. All data were analyzed through the computer facilities of the Northeast Regional Data Center of the Florida State University System, using the Statistical Package for the Social Sciences subprograms developed by Nie *et al*. (1975). The results of the analyses are presented below and in tabular form. They consist of : (1) descriptive data of the sample, including division of subjects into groups, demographic data of subjects, and the scores of all subjects on the pretest and posttest instruments; and (2) the statistical tests of each of the fourteen null hypotheses presented in sequential order.

Descriptive Data of the Sample

Assignment of Subjects to Groups

A total of 146 students attended the class meetings of their BE 100 classes during the week of the pretest. Of these, nine students declined to participate in the project because of personal reasons or because they had previously used SIGI. The remaining 137 stated that they wished some assistance in choosing a major or a career and volunteered to be subjects for the investigation. They were randomly assigned to the four groups used in the design. The assignment of the subjects into the four experimental groups is presented in Table I.

TABLE I

ASSIGNMENT OF SUBJECTS INTO GROUPS

Group Description	Subjects Assigned	Did Not Complete Treatment	Did Not Complete Posttest	Subjects For Analysis
Group 1 Pretested Treatment	35	10	7	18
Group 2 Pretested Control	29		6	23
Group 3 Untested Treatment	35	9	4	22
Group 4 Untested Control	38		17	21
TOTALS	137	19	34	84

Of the 70 subjects who were assigned to the two treatment groups, 19 did not complete the SIGI program and 11 were absent from class during the week of the posttest, resulting in a total of 40 subjects in the treatment groups (18 in group I and 22 in group III). Of the 67 subjects assigned to the control groups, 23 were absent from classes during the posttest, resulting in a total of 54 subjects in the control groups (23 in group II and 21 in group IV). Repeated attempts by the investigator and the participating instructors to encourage subjects to complete the treatment and/or the posttest were unsuccessful. Thus, out of a total of 137 subjects who volunteered for the investigation, data from only 84 could be used for testing the hypotheses. Finally, eleven students who had been absent from classes during the pretest completed the posttest, and data from these subjects are included in the demographic data presented below.

Demographic Data of Subjects

The demographic characteristics of all possible subjects and those subjects who completed the phases of the study to which they were assigned (the experimental subjects) are presented in Table 2. The 84 experimental subjects are very similar to the entire pool of 148 subjects on the variables of age; sex; academic program in which enrolled; number of terms of college completed, both as a full-time and part-time student; the amount of full-time work experience; and BE 100 class section in which they were enrolled. On the basis of these characteristics, there appeared to be no difference between experimental subjects and those who did not complete those phases to which they were assigned.

The 84 experimental subjects, on whom all other analyses were performed, range in age from 18-41 years, with a mean age of 23.00 and a median of 21.30. This is representative of the average age of students attending the college. Fifty-seven percent of the subjects were male and forty-three percent female. Seventy percent were enrolled in the Associate of Arts (the university parallel or transfer) program, and twenty-five percent were in the Associate of Science program (the terminal degree or vocational program). Only four subjects were enrolled in certificate programs; and in subsequent analysis on the basis of academic program, these subjects were not included.

For some subjects, the term in which the investigation was conducted was their first term as a college student. Others had completed over three years of college work. The mean number of terms completed (3.69) indicated that the average subject was a college

TABLE 2

DEMOGRAPHIC DATA OF POSSIBLE SUBJECTS AND OF EXPERIMENTAL SUBJECTS

Variable		Possible Subjects (N=148)	Experimental Subjects (N=84)
Age			
	Mean	22.28	23.00
	Standard deviation	4.98	4.87
	Median	20.43	21.30
	Range	17-41	18-41
	Subjects responding	133	84
Sex			
	Male	85 (57.4%)	48 (57.1%)
	Female	63 (42.6%)	36 (42.9%)
Academic Program in Which Enrolled			
	Associate of Arts	90 (66.7%)	59 (70.2%)
	Associate of Science	37 (27.4%)	21 (25.0%)
	Certificate Programs	8 (5.9%)	4 (4.5%)
	Subjects Responding	135	84
Number of Terms of College Completed			
	Mean	3.57	3.69
	Standard deviation	2.27	2.32
	Median	2.96	3.11
	Range	1-9	1-9
	Subjects responding	108	84
Number of Terms as a Full-Time Student			
	Mean	3.29	3.37
	Standard deviation	2.19	2.59
	Median	2.69	2.79
	Range	1-9	1-9
	Subjects responding	106	84
Veterans of Armed Services			
	Veteran	26 (24.8%)	22 (26.8%)
	Non-veteran	79 (75.2%)	60 (73.2%)
	Subjects responding	105	82

Table 2 (Continued)

Variable	Possible Subjects	Experimental Subjects
Full-Time Work Experience		
Yes	83 (76.9%)	69 (82.1%)
No	25 (23.1%)	15 (17.9%)
Subjects responding	108	84
Years of Full-Time Work Experience		
1 year or less	21 (25.6%)	16 (23.5%)
2 years	18 (22.0%)	14 (20.6%)
3 years	9 (11.0%)	9 (13.2%)
Over 3 years	34 (41.5%)	29 (42.6%)
Subjects responding	82	68
BE 100 Section in Which Enrolled		
Section 100.02	18 (12.2%)	8 (9.5%)
Section 100.05	15 (10.1%)	9 (10.7%)
Section 100.08	14 (9.5%)	13 (15.5%)
Section 100.09	11 (7.4%)	7 (8.3%)
Section 100.10	14 (9.5%)	6 (7.1%)
Section 100.11	13 (8.8%)	6 (7.1%)
Section 100.16	13 (8.8%)	7 (8.3%)
Section 100.17	15 (10.1%)	10 (11.9%)
Section 100.24	18 (12.2%)	10 (11.9%)
Section 100.25	14 (9.5%)	8 (9.5%)
Did not respond	3 (2.0%)	
Total Subjects	148 (100%)	84 (100%)

sophomore. The mean number of terms completed as a full-time student (3.37) indicated that the majority of subjects had attended college on a full-time basis; and this was unexpected considering the large percentage (nearly 50%) of part-time students who attend the community college.

A large percentage (82%) of subjects had engaged in full-time work experience, and of these, 42% had worked full-time for over three years. The sample thus was composed of many subjects who were familiar with some aspects of the world of work. Additionally, each of the ten BE 100 sections were well represented in the sample and each accounted for between 7-15% of the final sample. This was similar to the percentages of total subjects from each section.

Finally, there were no significant differences between subjects assigned to each of the four experimental groups on the variables of sex, academic program, work experience, or BE 100 class section (see Appendix C). No further analyses were performed on the pool of 148 subjects, and all further discussions pertain only to the 84 subjects who completed all phases of the study.

Responses of Subjects on the Pretest and Posttest

Frequencies of responses on the career information questionnaire for the 84 subjects are presented in Table 3, and the means and standard deviations of scores on the Career Maturity Inventory (CMI) scales are presented in Table 4. On the pretest, 57% indicated they had made a decision regarding an academic major, and 55% had made a decision regarding the choice of an occupation. During the five week interval of the investigation, eight additional subjects made choices on a major and four made career choices, as indicated on the posttest responses.

There were some shifts in the degree of commitment to an academic or occupational choice during the investigation, with many subjects reporting that they were firmer in their commitments to decisions on the posttest. On the pretest 29% of the subjects responding indicated their decision on a major was very tentative. This compared with 13% on the posttest. Similarly, on the pretest,

TABLE 3

FREQUENCIES AND PERCENTAGES OF EXPERIMENTAL SUBJECT RESPONSES ON PRE- AND POST-TREATMENT CAREER INFORMATION QUESTIONNAIRES

Response	Pretest		Posttest	
	N	%	N	%
1. Decision on an academic major:				
Have made a decision	57	69.5	65	77.4
Have not made a decision	25	30.5	19	22.6
N =	82		84	
2. Commitment to decision on major:				
The decision is definite	26	36.1	29	39.2
Decision made but could change	25	34.7	29	39.2
Decision is very tentative	21	29.2	10	13.5
N =	72		74	
3. Decision on occupational choice:				
Have made a decision	46	55.4	50	59.5
Have not made a decision	37	44.6	34	40.5
N =	83		84	
4. Commitment to decision on occupational choice:				
The decision is definite	18	28.6	22	35.5
Decision made but could change	24	38.1	30	48.4
Decision is very tentative	21	33.3	10	16.1
N =	63		62	

33% of subjects responding believed their decision on an occupation was tentative, but only 16% listed it as tentative on the posttest.

Pretest and posttest scores on the CMI are presented in Table 4. Subjects in all four groups completed the posttest CMI, but only those in groups I and II took the pretest CMI. The mean scores on the Attitude Scale were 37.10 for the pretest and 38.24 on the posttest. These are similar to the means reported in other studies of college students (Crites, 1973a; Walsh and Osipow, 1973; Walsh _et al_., 1973). There was only a slight increase in the mean score on the Attitude Scale from pretest to posttest for the entire sample (37.10 to 38.24).

Because the three CMI Competence Test scales are still in the experimental stage, there is no comparative data on other college-age students. Subjects scored higher on the Competence Test Part 2 - Knowing About Jobs (mean of 18.12) than they did on the other scales, Part I - Knowing Yourself (mean 14.17), and Part 3 - Choosing a Job (mean 14.46). Such data might lead one to conclude that these subjects as a group had a comparatively greater knowledge of occupations that they have about themselves or decision-making. Considering the large percentage of subjects who had held full-time employment for over one year, this finding would be expected.

Comparison of Experimental Groups on the Pretest

Subjects in all four experimental groups, the pretested SIGI group (group I), the pretested control (group II), the untested SIGI group (group III), and the untested control (group IV), responded to the four questions on the pretest career information questionnaire concerning decisions and commitments to those decisions on the choice of an academic major and the choice of an occupation. Comparisons of

TABLE 4

MEANS AND STANDARD DEVIATIONS OF PRETEST AND POSTTEST CAREER MATURITY INVENTORY SCORES

Scale	Groups I and II Pretest	Groups I and II Posttest	All Groups Posttest
Attitude Scale			
Mean	37.10	37.15	38.24
Standard Deviation	5.86	6.22	6.12
Range	24-46	24-47	15-47
N =	41	41	84
Competence Test - Part 1			
Mean	14.17	13.42	13.54
Standard Deviation	3.07	4.30	4.69
Range	6-19	3-18	2-20
N =	41	41	82
Competence Test - Part 2			
Mean	18.12	15.78	15.79
Standard Deviation	2.99	5.96	5.54
Range	4-20	3-20	2-20
N =	41	41	80
Competence Test - Part 3			
Mean	14.46	14.37	13.56
Standard Deviation	2.97	4.36	4.58
Range	8-19	4-20	2-20
N =	41	41	73

responses pertaining to the academic major are presented in Table 5, and those on occupational choice, in Table 6. Chi square analyses of the frequencies of responses of the four groups for each of the four questions reveal that there were no significant differences among the four groups on any of the items. In each case, however, a larger percentage of subjects in group I had made decisions on an occupational choice (67%) and an academic major (83%) than had subjects in the other groups. Furthermore, subjects in group I appeared to be more committed to the academic and vocational choices they had made as indicated by their responses on the questionnaire. While no significant differences were found, Tables 5 and 6 indicate that subjects in group I could have been slightly more advanced in their academic and vocational decision-making at the time of the pretest.

Pretest comparisons of groups I and II on the CMI are presented in Table 7. On each of the four scales, subjects in the treatment group had higher scores than subjects in the control group. Only on the Competence Test - Part I (Knowing Yourself) did the difference reach the .05 level of significance. These data also lend support to the suggestion that subjects in group I may have been slightly more advanced in their career decision making and career maturity, although a significant difference is noted on only the one scale.

The Null Hypotheses

Test for Hypotheses $H_0 1$ through $H_0 4$

Four null hypotheses concerned the posttest scores on the CMI scales and results related to these four hypotheses are presented in Table 8. The mean posttest scores for the CMI Attitude Scale were 38.11 and 38.00 for the two treatment groups and 36.39 and 40.12 for

TABLE 5

CHI SQUARE ANALYSIS OF PRETEST DECISIONS ON ACADEMIC MAJOR

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1. Have you made any decisions on an academic major?

GROUP		YES	NO	ROW TOTALS
Pretested Treatment	N =	15	3	18
	% =	(83.3)	(12.7)	
Pretested Control	N =	16	7	23
	% =	(69.6)	(30.4)	
Untested Treatment	N =	13	8	21
	% =	(61.9)	(38.1)	
Untested Control	N =	13	7	20
	% =	(65.0)	(35.0)	
COLUMN TOTALS		57	25	82

Chi Square = 2.388 df = 3 P >.05

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2. How firm are you in your decision to major in this field?

GROUP		DEFINITE DECISION	MADE BUT MAY CHANGE	VERY TENTATIVE	ROW TOTALS
Pretested Treatment	N =	8	4	4	16
	% =	(50)	(25)	(25)	
Pretested Control	N =	5	10	5	20
	% =	(25)	(50)	(25)	
Untested Treatment	N =	7	6	5	18
	% =	(39)	(33)	(28)	
Untested Control	N =	6	5	7	18
	% =	(33)	(28)	(39)	
COLUMN TOTALS		26	28	21	72

Chi Square = 4.465 df = 6 p > .05

TABLE 6

CHI SQUARE ANALYSIS OF PRETEST DECISIONS ON OCCUPATIONAL CHOICE

1. Have you made any decisions on an occupational choice?

GROUP		YES	NO	ROW TOTALS
Pretested Treatment	N =	12	6	18
	% =	(67)	(33)	
Pretested Control	N =	9	14	23
	% =	(39)	(41)	
Untested Treatment	N =	11	10	21
	% =	(52)	(48)	
Untested Control	N =	14	7	21
	% =	(67)	(33)	
COLUMN TOTALS		46	37	83

Chi Square = 4.545 df = 3 $p > .05$

2. How firm are you in your occupational choice?

GROUP		DEFINITE DECISION	MADE BUT MAY CHANGE	VERY TENTATIVE	ROW TOTALS
Pretested Treatment	N =	6	5	4	15
	% =	(40)	(33)	(27)	
Pretested Control	N =	3	6	6	15
	% =	(20)	(40)	(40)	
Untested Treatment	N =	5	6	7	18
	% =	(28)	(33)	(39)	
Untested Control	N =	4	7	4	15
	% =	(27)	(47)	(26)	
COLUMN TOTALS		18	24	21	63

Chi Square = 2.361 df = 6 $p > .05$

TABLE 7

T-TEST ANALYSIS OF PRETEST CAREER MATURITY INVENTORY SCORES

Scale	N	Mean	s.d.	t
Attitude Scale				
Group I	18	37.72	5.97	0.60
Group II	23	36.61	5.85	
Competence Test - Part I				
Group I	18	15.22	1.87	2.02*
Group II	23	13.35	3.58	
Competence Test - Part 2				
Group I	18	18.66	1.53	1.03
Group II	23	17.69	3.75	
Competence Test - Part 3				
Group I	18	15.16	2.50	1.36
Group II	23	13.91	3.23	

df = 39 *$p < .05$

the two control groups. Analysis of variance tests revealed that there were no significant differences among the four groups on the posttest Attitude Scale, and thus Null Hypothesis H_01 is accepted.

The mean posttest scores on the Competence Test - Part 1 (Knowing Yourself) were 14.56 for group I, 12.52 for group II, 13.14 for group III, and 14.26 for group IV. None of these differences reached a .05 level of probability, and thus Null Hypothesis H_02 is not rejected.

The mean posttest scores on the CMI Competence Test - Part 2 (Knowing About Jobs) were 16.33 for group I, 15.35 for group II, 14.95 for group III, and 16.78 for group IV. There were no significant differences among these means, and Null Hypothesis H_03 is accepted.

The mean posttest scores on the CMI Competence Test - Part 3 (Choosing a Job) were 15.00 for group I, 13.80 for group II, 12.39 for group III, and 13.00 for group IV. Using the analysis of variance test, no differences were found to be significant, and H_04 is also accepted.

Upon examination of Table 8, it becomes apparent that subjects in group IV, the untested control group, scored higher than those in other groups on both the posttest Attitude Scale and Part 2 of the Competence Test, while subjects in group I scored higher than other groups on Parts 1 and 3 of the Competence Test. There is no apparent pattern to the relative scores of the four groups, except that group IV performed exceptionally well on all scales. It thus does not appear that being involved in the SIGI program improved the levels of vocational maturity, as measured by the CMI.

TABLE 8

ANALYSIS OF VARIANCE OF POSTTEST CAREER MATURITY INVENTORY SCORES

1. Attitude Scale

Group	N	Mean	s.d.	Range
Pretested Treatment	18	38.11	6.77	22-47
Pretested Control	23	36.39	5.58	24-45
Untested Treatment	22	38.00	7.20	15-47
Untested Control	21	40.62	3.90	33-47
TOTALS	84	38.24	6.12	15-47

Analysis of Variance

Source	df	Sum of Squares	Mean Squares	F
Between groups	3	199.00	66.33	1.82
Within groups	80	2910.31	36.38	
Totals	83	3109.31		

$p > .05$

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2. Competence Test - Part I

Group	N	Mean	s.d.	Range
Pretested Treatment	18	14.56	3.48	8-18
Pretested Control	23	12.52	4.73	3-18
Untested Treatment	22	13.14	5.38	2-20
Untested Control	19	14.26	4.84	2-20
TOTALS	82	13.54	4.69	2-20

Analysis of Variance

Source	df	Sum of Squares	Mean Squares	F
Between groups	3	55.93	18.64	0.841
Within groups	78	1728.47	22.16	
Totals	81	1784.39		

$p > .05$

Table 8 (Continued)

3. Competence Test - Part 2

Group	N	Mean	s.d.	Range
Pretested Treatment	18	16.33	6.01	3-20
Pretested Control	23	15.35	6.01	3-20
Untested Treatment	21	14.95	5.53	2-20
Untested Control	18	16.78	4.63	2-20
TOTALS	80	15.79	5.54	2-20

Analysis of Variance

Source	df	Sum of Squares	Mean Squares	F
Between groups	3	42.10	14.03	0.447
Within groups	76	2385.29	31.38	
Total	79	2427.39		

$p > .05$

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4. Competence Test - Part 3

Group	N	Mean	s.d.	Range
Pretested Treatment	18	15.00	3.83	6-20
Pretested Control	20	13.80	4.81	4-20
Untested Treatment	18	12.39	4.91	3-19
Untested Control	17	13.00	4.61	2-17
TOTALS	73	13.56	4.58	2-20

Analysis of Variance

Source	df	Sum of Squares	Mean Squares	F
Between groups	3	68.49	22.83	1.094
Within groups	69	1439.48	20.86	
Total	72	1507.98		

$p > .05$

Tests for Hypotheses $H_0 5$ through $H_0 8$: Comparison of Experimental Groups

According to Null Hypothesis $H_0 5$, there would be no significant differences among the groups on the ability to state an occupational choice, and according to $H_0 6$ there would be no significant differences among the groups in their commitment to any occupational choice they had made. Data pertaining to these two hypotheses are presented in Table 9. Chi square analyses on the frequencies of the responses revealed no significant differences between the groups in either the ability to state an occupation or the commitment to an occupational choice. Null Hypotheses $H_0 5$ and $H_0 6$ are not rejected. Inspection of Table 9 also indicates that no apparent pattern of responses occurred in answering the first item. Over 60% of each group--except group II--indicated that they had made a choice. Subjects who had taken SIGI were slightly more committed to their decision, but the differences were negligible.

Hypotheses $H_0 7$ and $H_0 8$ related to subjects' decisions on academic majors and their commitments to those decisions. Information on these hypotheses are in Table 10. On the question, "Have you decided on an academic major?", a larger percentage of each of the control groups than of the treatment groups indicated "yes." Chi square analysis, however, indicated that these differences were not significant, causing Hypothesis $H_0 7$ to be accepted.

Results of the comparison of commitment to a decision on an academic major revealed that no significant differences existed on the posttest, and Hypothesis $H_0 8$ is also accepted. There was, however, a pattern to the responses on both the decision on a major and a commitment to that decision. A smaller percentage of subjects in each

TABLE 9

CHI SQUARE ANALYSIS OF POSTTEST DECISIONS ON OCCUPATIONAL CHOICE

1. Have you made any decisions on an occupational choice?

GROUP		YES	NO	ROW TOTALS
Pretested Treatment	N =	11	7	18
	% =	(61)	(39)	
Pretested Control	N =	11	12	23
	% =	(47)	(52)	
Untested Treatment	N =	15	7	22
	% =	(68)	(32)	
Untested Control	N =	13	8	21
	% =	(62)	(38)	
COLUMN TOTALS		50	34	84

Chi Square = 2.059 df = 3 p > .05

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2. How firm are you in your occupational choice?

GROUP		DEFINITE DECISION	MADE BUT MAY CHANGE	VERY TENTATIVE	ROW TOTALS
Pretested Treatment	N =	7	5	2	14
	% =	(50)	(36)	(14)	
Pretested Control	N =	5	7	4	16
	% =	(31)	(44)	(25)	
Untested Treatment	N =	7	8	3	
	% =	(39)	(44)	(17)	18
Untested Control	N =	3	10	1	14
	% =	(21)	(71)	(7)	
COLUMN TOTALS		22	30	10	62

Chi Square = 5.394 df = 6 p > .05

TABLE 10

CHI SQUARE ANALYSIS OF POSTTEST DECISIONS ON ACADEMIC MAJOR

1. Have you made any decisions on an academic major?

GROUP		YES	NO	ROW TOTALS
Pretested Treatment	N =	11	7	18
	% =	(61)	(39)	
Pretested Control	N =	19	4	23
	% =	(83)	(17)	
Untested Treatment	N =	17	5	22
	% =	(77)	(23)	
Untested Control	N =	18	3	21
	% =	(86)	(14)	
COLUMN TOTALS		65	19	84

Chi Square = 3.915 df = 3 $p > .05$

2. How firm are you in your decisions to major in this field?

GROUP		DEFINITE DECISION	MADE BUT MAY CHANGE	VERY TENTATIVE	ROW TOTALS
Pretested Treatment	N =	7	6	1	14
	% =	(50)	(43)	(7)	
Pretested Control	N =	7	10	4	21
	% =	(33)	(48)	(19)	
Untested Treatment	N =	10	9	1	20
	% =	(50)	(45)	(5)	
Untested Control	N =	5	10	4	19
	% =	(26)	(53)	(21)	
COLUMN TOTALS		29	35	10	74

Chi Square = 4.965 df = 6 $p > .05$

of the treatment groups had made an occupational choice (61% for group I and 77% for group III) than had subjects in the two control groups (83% for group II and 86% for group IV). A possible explanation may be that the SIGI program exposed subjects to a greater number of possible majors than they had previously considered, and thus these subjects were still considering various academic fields and had not made any decisions yet.

Those subjects who had been involved in the SIGI program and who had made a choice on a major tended to be more committed to that choice than subjects in the control groups. A total of 50% of each of the treatment groups indicated their decision was "very firm" compared to 33% and 36% of subjects in groups II and IV, respectively. Participation in the SIGI program may have confirmed these subjects' academic choices, thus they may have become more firm in their decisions. This explanation is only tentative, however, since the differences among the four groups did not reach an acceptable level of significance.

Test for Hypothesis $H_0 9$: Comparison of Pretest-Posttest CMI Scores for Group I and for Group II

According to Hypothesis $H_0 9$, there would be no significant difference between the pretest-posttest CMI scores for either of the pretested groups. Table 11 contains the analysis of this information for group I and Table 12 has the data for group II. For group I, t-tests indicated that there were no significant differences between the pretest and posttest scores for any of the four scales. There was a slight increase in mean scores on the Attitude Scale between pretest and posttest, but there were decreases in scores for each of the three scales on the Competence Test. Additionally, there were significant

TABLE II

COMPARISON OF THE PRETEST AND POSTTEST CAREER MATURITY INVENTORY SCORES FOR PRETESTED TREATMENT GROUP

Scale	Mean	s.d.	t	Corr.
Attitude Scale				
Pretest	37.72	5.97	-0.34	.71*
Posttest	38.11	6.77		
Competence Test - Part 1				
Pretest	15.22	1.87	0.82	.29
Posttest	14.55	3.49		
Competence Test - Part 2				
Pretest	18.66	1.53	1.61	.05
Posttest	16.33	6.01		
Competence Test - Part 3				
Pretest	15.16	2.50	0.20	.45*
Posttest	15.00	3.84		

N = 18

*Correlation significant at .05 level

TABLE 12

COMPARISON OF THE PRETEST AND POSTTEST CAREER MATURITY INVENTORY SCORES FOR PRETESTED CONTROL GROUP

Scale	Mean	s.d.	t	Corr.
Attitude Scale				
Pretest	36.61	5.85	.20	.61*
Posttest	36.39	5.78		
Competence Test - Part 1				
Pretest	13.35	3.58	1.25	.74*
Posttest	12.52	4.73		
Competence Test - Part 2				
Pretest	17.69	3.75	2.30**	.58*
Posttest	15.35	6.01		
Competence Test - Part 3				
Pretest	14.05	3.35	0.24	.37
Posttest	13.80	4.81		

N = 23

*Correlation significant at .01 level

**$p < .05$, df = 22

correlations ($p < .05$) for the two administrations of the Attitude Scale and of the Competence Test Part 3. This indicates that a subject's score in relation to other subjects' scores remained stable over the five week interval on these two scales.

For group II, there were significant differences only between the pretest and posttest administration of the Competence Test - Part 2, and the average posttest score was lower than the pretest score. On all other scales, posttest scores were also lower than pretest scores, but the differences were insignificant. Finally, there were significant correlations between the two administrations of each scale except the Competence Test - Part 3, indicating that a subject's score was stable over a five week interval. Based on the information in Table 11 and Table 12, Hypothesis $H_0 9$ is not rejected. Finally, one may observe that except for the responses of group I on the Attitude Scale, posttest scores for both groups on all scales were lower than their pretest scores.

Tests for Hypotheses $H_0 10$ and $H_0 11$: Comparison of Male and Female Treatment Subjects

Null Hypothesis $H_0 10$ states that there would be no significant differences in the scores on the CMI scales of male and female subjects who had participated in SIGI. Data pertinent to this hypothesis are presented in Table 13. On the pretest Competence - Part 2, the mean score for males was 0.07 higher than that for females. With this one exception, females scored higher than males for every scale on the CMI in both the pretest and posttest administrations. Furthermore, the differences between males and females are more pronounced on the posttest measures. A t-test procedure was used to determine significant

TABLE 13

T-TEST ANALYSIS OF CAREER MATURITY INVENTORY PRETEST AND POSTTEST SCORES OF MALE AND FEMALE EXPERIMENTAL SUBJECTS

Scale	N	Mean	s.d.	t	df
Pretest Attitude Scale					
Males	10	36.00	5.62	-1.41	16
Females	8	39.88	6.03		
Pretest Competence Test - Part 1					
Males	10	14.70	1.49	-1.36	16
Females	8	15.87	2.17		
Pretest Competence Test - Part 2					
Males	10	18.70	1.25	0.10	16
Females	8	18.63	1.92		
Pretest Competence Test - Part 3					
Males	10	14.20	2.74	-1.98	16
Females	8	16.38	1.59		
Posttest Attitude Scale					
Males	22	36.18	8.06	-1.95	38*
Females	18	40.33	4.43		
Posttest Competence Test - Part 1					
Males	22	11.86	5.04	-3.23	38*
Females	18	16.11	2.69		
Posttest Competence Test - Part 2					
Males	22	14.27	6.45	-1.67	37
Females	17	17.29	4.21		
Posttest Competence Test - Part 3					
Males	19	12.58	5.24	-1.59	34
Females	17	14.94	3.33		

*$p < .05$

differences. The differences between the two groups were significant at the .05 level of confidence on the posttest Attitude Scale and on the Competence Test - Part 1. The differences on Part 2 and on Part 3 approached a significance level ($p < .10$ and $p < .07$, respectively). On the basis of this information, Hypotheses $H_0$10a and $H_0$10b are rejected, and Hypotheses $H_0$10c and $H_0$10d are accepted.

Inspection of Table 13 also revealed that both males and females had higher scores on the posttest Attitude Scale than on the pretest Attitude Scale, although the improvement in scores is very slight (0.16 for males and 0.45 for females). Females also improved their scores on the Competence Test - Part 1 from pretest to posttest by .64 of a point. On the same scale, male scores dropped from 14.70 to 11.86. Both males and females scored lower on the posttest administration of parts 1 and 2 of the Competence Test than they had on the pretest administration, but in all cases the male scores dropped lower than female scores. On the basis of this information, it could be concluded that females in general tended to benefit somewhat more from SIGI than did males, but in absolute terms the effects of SIGI on the vocational maturity of both males and females was mixed. On some measures it may even have a negative effect.

Hypothesis $H_0$11 stated that there would be no differences between male and female treatment subjects in their ability to state an academic major or an occupational choice, nor in their commitment to their choices. Results of tests on this hypothesis are presented in Tables 14 and 15.

There were no significant differences between males and females in their decision on an academic major on either the pretest or posttest.

TABLE 14

CHI SQUARE ANALYSIS OF PRETEST AND POSTTEST DECISIONS ON ACADEMIC MAJOR BY MALE AND FEMALE EXPERIMENTAL SUBJECTS

1. Have you made any decisions on an academic major?

PRETEST

	Yes	No	Row Totals
Male	14	7	21
Female	14	4	18
Column Total	28	11	39

Chi Square = .169 df = 1
p > .05

POSTTEST

	Yes	No	Row Totals
Male	15	7	22
Female	13	5	18
Column Total	28	12	40

Chi Square = .005 df = 1
p > .05

2. How firm are you in your decision to major in this field?

PRETEST

	Very Firm	May Change	Tentative	Row Totals
Male	10	1	6	17
Female	5	9	3	17
Column Total	15	10	9	34

Chi Square = 9.066 df = 2 p < .05

POSTTEST

	Very Firm	May Change	Tentative	Row Totals
Male	8	9	1	18
Female	9	6	1	16
	17	15	2	34

Chi Square = 0.543 df = 2 p > .05

TABLE 15

CHI SQUARE ANALYSIS OF PRETEST AND POSTTEST DECISIONS ON OCCUPATIONAL CHOICE BY MALE AND FEMALE EXPERIMENTAL SUBJECTS

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1. Have you made any decisions on an occupational choice?

PRETEST

	Yes	No	Row Totals
Male	12	9	21
Female	11	7	18
Column Total	23	16	39

Chi Square = .006 df = 1 $p > .05$

POSTTEST

	Yes	No	Row Totals
Male	12	10	22
Female	14	4	18
Column Total	26	14	40

Chi Square = 1.439 df = 1 $p > .05$

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2. How firm are you in your decision to enter this occupation?

PRETEST

	Very Firm	May Change	Tentative	Row Totals
Male	6	5	7	18
Female	5	6	4	15
Column Totals	11	11	11	33

Chi Square = .733 df = 1 $p > .05$

POSTTEST

	Very Firm	May Change	Tentative	Row Totals
Male	6	8	3	17
Female	8	5	2	15
Column Totals	14	13	5	32

Chi Square = 1.057 df = 2 $p > .05$

Furthermore, the responses of both groups remained basically unchanged from pretest to posttest. Hypothesis H_0IIa is therefore accepted. Although there was a significant difference between the two groups in their commitment to a decision on a major on the pretest, the posttest difference was not significant and H_0IIb is also accepted. Comparison of the pretest and posttest answers to this question revealed that in general females became more committed to any choice they had made and males became somewhat less committed. However, while 11 subjects indicated on the pretest that their decision was very tentative, only 2 subjects indicated this on the posttest. SIGI thus has some effect on the commitment to an academic decision, and this tends to be somewhat stronger for females than for males. This conclusion, however, can only be tentative since the differences were not significant.

Table 15 indicates that there were no differences between males and females in their decision on an occupation, and the posttest data for males between pretest and posttest is unchanged. Three females made a choice during the study. Hypothesis H_0IIc is accepted. There were no differences between the groups in their commitment to an occupational decision and H_0IId also is accepted. The pattern of commitment to an occupational decision is similar to that on a major; there was a slight increase in commitment between pretest and posttest administration.

Test for Hypotheses $H_0$12 and $H_0$13: Comparison of Associate of Arts and Associate of Science Treatment Subjects

According to $H_0$12, there would be no differences between treatment subjects' scores on the CMI scales on the basis of the academic program in which they were enrolled. Because of the small number of subjects in the one-year certificate programs, only subjects enrolled in the Associate of Arts and Associate of Science programs were compared. The t-test comparisons of scores on these two groups are in Table 16. Although Associate of Arts subjects scored higher on each scale of both the pretest and posttest CMI, the differences were insignificant and Hypothesis $H_0$12 is not rejected. Furthermore, posttest scores on the Competence Test scales were lower on the posttest than they were on the pretest for each of the groups. For the Attitude Scale, posttest scores were basically unchanged from pretest scores.

Hypothesis $H_0$13 concerned the differences between the two groups in the decisions on an academic major and an occupation and their commitments to those decisions. Tables 17 and 18 contain analyses of this information. Chi square analysis indicated no significant differences between subjects in the two programs in the ability to state an academic major on either the pretest or posttest. Of the 59 subjects in the Associate of Arts program, 41 stated on the pretest that they had decided on a major, and on the posttest 46 had decided. Of the 21 Associate of Science subjects, 14 had made a decision before the pretest and 16 had made a decision by the date of the posttest. Thus a total of seven subjects had made decisions on a major field of study during the five weeks of the study. Hypothesis $H_0$13a is accepted.

Table 17 also reveals that there were shifts in the degree of commitment to the decision on a major, and in general the commitments of both groups became stronger after being involved with SIGI. There were no significant differences between the two groups on the pretest, but significant differences existed on the posttest. Associate of Science subjects were significantly more committed to their academic

TABLE 16

T-TEST COMPARISON OF CAREER MATURITY INVENTORY PRETEST AND POSTTEST SCORES OF ASSOCIATE OF ARTS AND ASSOCIATE OF SCIENCE EXPERIMENTAL SUBJECTS

Scale	N	Mean	s.d.	t*	df
Pretest Attitude Scale					
Associate of Arts	14	38.50	6.04	.48	15
Associate of Science	3	36.66	5.51		
Pretest Competence Test - Part 1					
Associate of Arts	14	15.64	1.78	1.20	15
Associate of Science	3	14.33	1.16		
Pretest Competence Test - Part 2					
Associate of Arts	14	18.64	1.74	-.02	15
Associate of Science	3	18.66	0.85		
Pretest Competence Test - Part 3					
Associate of Arts	14	15.20	2.61	0.33	15
Associate of Science	3	14.67	2.89		
Posttest Attitude Scale					
Associate of Arts	26	38.96	6.52	1.07	36
Associate of Science	12	36.33	8.00		
Posttest Competence Test - Part 1					
Associate of Arts	26	14.58	3.64	1.56	36
Associate of Science	12	12.08	6.24		
Posttest Competence Test - Part 2					
Associate of Arts	26	16.04	5.50	1.02	35
Associate of Science	12	13.91	6.53		
Posttest Competence Test - Part 3					
Associate of Arts	26	14.04	4.69	1.02	35
Associate of Science	12	12.13	4.45		

*$p > .05$ for each t

TABLE 17

CHI SQUARE ANALYSIS OF PRETEST AND POSTTEST DECISIONS ON ACADEMIC MAJOR BY ASSOCIATE OF ARTS AND ASSOCIATE OF SCIENCE EXPERIMENTAL SUBJECTS

1. Have you made any decisions on an academic major?

PRETEST

	Yes	No	Row Totals
Associate of Arts	41	18	59
Associate of Science	14	5	19
Column Total	55	23	78

Chi Square = .004 df = 1 $p > .05$

POSTTEST

	Yes	No	Row Totals
Associate of Arts	46	13	59
Associate of Science	16	5	21
Column Total	62	18	80

Chi Square = .188 df = 1 $p > .05$

2. How firm are you in your decision to major in this field?

PRETEST

	Very Firm	May Change	Tentative	Row Totals
Associate of Arts	20	14	18	52
Associate of Science	5	9	3	17
Column Total	25	23	21	69

Chi Square = 4.103 df = 2 $p > .05$

	Very Firm	May Change	Tentative	Row Totals
Associate of Arts	17	27	10	54
Associate of Science	10	7	0	17
Column Total	27	34	10	71

Chi Square = 5.900 df = 2 $p < .05$

choice, with over 50% stating that they were very firm in their choice of a major. Thus, Hypothesis $H_0$13b is rejected.

Table 18 shows that there were no significant differences between the groups on the decision of an occupation on either the pretest or posttest. Of the 59 Associate of Arts subjects, 30 (approximately 50%) indicated on the pretest and 34, on the posttest, that they had made a decision on an occupation. Approximately two-thirds of the Associate of Science subjects indicated they had made the decision on both the pretest and posttest. No differences were significant, however, and $H_0$13c is accepted.

Finally, there were no significant differences between the groups in their commitment to the choice of an occupation on either the pretest or posttest, and $H_0$13d also is accepted. Subjects in both groups, however, became somewhat more committed to their decision after being involved with SIGI.

Test for Hypothesis $H_0$14: Interaction Effects between the Pretest and the SIGI Treatment

According to Hypothesis $H_0$14, there would be no interaction effects between the pretest CMI and the SIGI treatment. To test this hypothesis, posttest CMI scored for group I were compared with the posttest CMI scores of group III. The results of this comparison appear in Table 8. On each of the four scales, subjects in group I scores higher than subjects in group III. None of the differences were found to be significant, as indicated by the analysis of variance analyses, and $H_0$14 is accepted.

TABLE 18

CHI SQUARE ANALYSIS OF PRETEST AND POSTTEST DECISIONS ON OCCUPATIONAL CHOICE BY ASSOCIATE OF ARTS AND ASSOCIATE OF SCIENCE EXPERIMENTAL SUBJECTS

1. Have you made any decisions on an occupational choice?

PRETEST

	Yes	No	Row Totals
Associate of Arts	30	29	59
Associate of Science	13	7	20
Column Total	43	36	79

Chi Square = 0.703 df = 1 p > .05

POSTTEST

	Yes	No	Row Totals
Associate of Arts	34	25	59
Associate of Science	14	7	21
Column Total	48	32	80

Chi Square = 0.218 df = 1 p > .05

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2. How firm are you in your decision to enter this occupation?

PRETEST

	Very Firm	May Change	Tentative	Row Totals
Associate of Arts	13	14	15	42
Associate of Science	4	9	5	18
Column Totals	17	23	20	60

Chi Square = 1.490 df = 2 p > .05

POSTTEST

	Very Firm	May Change	Tentative	Row Totals
Associate of Arts	13	21	9	43
Associate of Science	9	6	1	16
Column Totals	22	27	10	59

Chi Square = 3.927 df = 2 p > .05

Analyses of Subgroups of Subjects

Study of Subjects Under the Age of 25

Included in the group of 84 experimental subjects were 22 individuals between the ages of 25-41. While this age range may be representative of the community college student enrollment, it was felt that their inclusion in the study may have obscured the effects that SIGI may have had on the younger subjects. Therefore a complete analysis of all data was made for subjects under the age of 25. The results of this analysis were similar to those reported above, and no other significant differences between treatment and control subjects were revealed for each of the hypotheses. There was, however, a stronger trend for subjects involved with SIGI to become more committed to their decision on academic majors and on occupations.

Study of Subjects Undecided or Uncommitted to an Academic or Vocational Decision

Of the 84 subjects, 49 indicated on the pretest career information questionnaire that they had either (1) not made a decision on a major or (2) not made a decision on an occupation, or (3) had made a decision on a major but the decision was very tentative and could easily change, or (4) had made a very tentative occupational decision. Thirty-five subjects had made both decisions on major and on careers and were somewhat committed to those decisions. It was felt that SIGI may have had more effects on undecided or uncommitted subjects which were not revealed in testing the hypotheses of the study. Therefore a third complete analysis of data for only those 49 subjects was made, and the two treatment groups were combined and compared with the combined control groups for this analysis. No significant differences were found on any of the CMI scales. Additionally the same number of treatment and control subjects (4) made an occupational decision during the study. Subjects who had completed SIGI, however, were more committed to their occupational decision than control subjects, although differences were not significant.

Two additional treatment subjects and eight additional control subjects made decisions on academic majors during the study. The posttest differences between treatment and experimental subjects were not significant, however. The treatment subjects became more committed to academic decisions they had made than did the control subjects. Furthermore, the difference in commitment between the two groups on the posttest were significant at the $p < .05$ level.

CHAPTER V

DISCUSSION AND SUMMARY

Summary of the Investigation

According to research reviewed in Chapter II, vocational behavior is a developmental process and career intervention programs can facilitate this process. Several types of these programs have been devised, including computer-based interactive career guidance programs such as SIGI. The literature review also revealed that one method of determining the effectiveness of a career intervention program on the vocational development of clients was to test the extent to which the clients' vocational maturity was increased. The CMI has been developed as a measure of vocational maturity and has been employed in numerous experimental studies, using pretest-posttest designs to determine the effects of particular programs in increasing subjects' career maturity as measured by the CMI.

This study was designed to determine the effects of SIGI, an interactive computer guidance system developed by the Educational Testing Service for use with post-secondary students. The Career Maturity Inventory was used to assess the effects of participation in SIGI on selected vocational behaviors of community college students. It was hypothesized that SIGI would have an impact on subjects' attitudes toward careers (as measured by the CMI-Attitude Scale) and would increase subjects' knowledge of themselves, their knowledge of careers, and their decision-making skills (as measured by the three scales of the

Competence Test). Also it was hypothesized that SIGI would increase a subject's ability to decide on an academic major and on an occupation and would increase a subject's commitment to academic or vocational decisions already made (both as measured by the career information questionnaire designed by the author). This study also investigated the differential effects of the SIGI program on males and females and on subjects in either terminal degree or transfer programs.

A group of 84 community college students participated as subjects in the study and were randomly assigned to four experimental groups according to the Solomon-Four Group Experimental Design. They were administered the CMI and the career information questionnaire as a pretest and posttest before and after completing the SIGI program (a five week interval). The findings of the investigation were presented in Chapter IV.

Summary of the Results

Fourteen null hypotheses were tested during the investigation. The hypotheses and the results of the experimental tests on each are:

$H_0$1: There will be no significant difference in the career choice attitudes, as measured by the CMI-Attitude Scale, between subjects who have participated in the SIGI program and the control subjects. Hypothesis accepted.

$H_0$2: There will be no significant difference in the self appraisal career competence, as measured by the CMI-Competence Test - Part 1, between subjects who have participated in the SIGI program and the control subjects. Hypothesis accepted.

$H_0$3: There will be no significant difference in the level of occupational information, as measured by the CMI Competence Test - Part 2, between subjects who have participated in the SIGI program and control subjects. Hypothesis accepted.

$H_0$4: There will be no significant difference in the goal selection career choice competency, as measured by the CMI Competence Test - Part 3, between subjects who have participated in the SIGI program and the control subjects. Hypothesis accepted.

$H_0 5$: There will be no significant difference in the ability to state a choice of an occupation, as measured by the career information questionnaire, between subjects who have participated in the SIGI program and control subjects. Hypothesis accepted.

$H_0 6$: There will be no significant difference in the degree of commitment to an occupational choice, as measured by the career information questionnaire, between subjects who have participated in the SIGI program and the control subjects. Hypothesis accepted.

$H_0 7$: There will be no significant difference in the ability to state an academic major as measured by the career information questionnaire, between subjects who have participated in the SIGI program and control subjects. Hypothesis accepted.

$H_0 8$: There will be no significant difference in the degree of commitment to an academic major, as measured by the career information questionnaire, between subjects who have participated in the SIGI program and control subjects. Hypothesis accepted.

$H_0 9$: There will be no significant difference in the pretest-posttest gain scores of subjects who have participated in the SIGI program and the pretest-posttest gain scores of the control subjects on the following measures:
  $H_0 9a$: CMI Attitude Scale - Hypothesis accepted.
  $H_0 9b$: CMI Competence Test - Part 1 - Hypothesis accepted.
  $H_0 9c$: CMI Competence Test - Part 2 - Hypothesis accepted.
  $H_0 9d$: CMI Competence Test - Part 3 - Hypothesis accepted.

$H_0 10$: There will be no significant differences between the scores of males who have participated in the SIGI program and the scores of females who have participated in the SIGI program on the following measures:
  $H_0 10a$: CMI Attitude Scale - Hypothesis rejected.
  $H_0 10b$: CMI Competence Test - Part 1 - Hypothesis rejected.
  $H_0 10c$: CMI Competence Test - Part 2 - Hypothesis accepted.
  $H_0 10d$: CMI Competence Test - Part 3 - Hypothesis accepted.

$H_0 11$: There will be no significant differences between males and females who have participated in the SIGI program on the following variables of the career information questionnaire:
  $H_0 11a$: Their decision on an academic major - Hypothesis accepted.
  $H_0 11b$: Their degree of commitment to a decision on a major - Hypothesis accepted.
  $H_0 11c$: Their decision on an occupational choice - hypothesis accepted.
  $H_0 11d$: Their degree of commitment to a decision on an occupation - Hypothesis accepted.

$H_0$12: There will be no significant differences in the scores of subjects enrolled in the Associate of Arts program, the Associate of Science program, or a Certificate program who have participated in the SIGI program on the following measures:

- $H_0$12a: CMI-Attitude Scale - Hypothesis accepted.
- $H_0$12b: CMI Competence Test - Part I - Hypothesis accepted.
- $H_0$12c: CMI Competence Test - Part 2 - Hypothesis accepted.
- $H_0$12d: CMI Competence Test - Part 3 - Hypothesis accepted.

$H_0$13: There will be no significant difference between subjects in the Associate of Arts program, the Associate of Science program, or a Certificate program who have participated in the SIGI program on the following measures:

- $H_0$13a: Their decision on an academic major - Hypothesis accepted.
- $H_0$13b: Their degree of commitment to the decision on a major - Hypothesis rejected.
- $H_0$13c: Their decision on an occupational choice - Hypothesis accepted.
- $H_0$13d: Their degree of commitment to the decision on an occupation - Hypothesis accepted.

$H_0$14: There will be no significant interaction effects between the pretest and the SIGI treatment. Hypothesis accepted.

Interpretation and Discussion of Findings

None of the fourteen null hypotheses was rejected in full, and no trends in the findings could be ascertained for most posttest measures. One might conclude that the SIGI program is ineffective as a career guidance technique in facilitating college students' career maturity. However, several factors must be considered before making conclusions on the basis of this research.

The Career Maturity Inventory

Although numerous measures of vocational maturity have been proposed, the CMI has been the most widely used and researched instrument presently available. A number of factors concerning this instrument were reviewed in Chapter II which must again be considered in making any conclusions. First, Crites proposed a four-component model of vocational maturity, and the Attitude Scale and Competence Test measure only two of these four components. At this time, therefore, it is not possible to measure all of the components of vocational maturity that Crites proposed. Secondly, the Competence Test is still only a research instrument, and validity and reliability data are not available on three of the scales used in this study. The scales were chosen because they were designed to measure many of the same skills which SIGI was designed to provide. However, the finding that on a second administration of the instrument average scores declined for all subjects could cause one to question the validity of the Competence Test for this age population.

The CMI Attitude Scale has been extensively used in studies of students from elementary school through the senior year of college. Previous studies have reported that various intervention programs have been responsible for an increase in scores on the Attitude Scale. It has been shown to be a reliable indication of a program's effects on clients. The Attitude Scale has chiefly been used with programs involving human interaction and not the interaction with a computer. Possibly the Attitude Scale is more sensitive to the changes resulting in fairly intense personal encounters. Possibly attitudes towards careers can change best through personal encounters.

Perhaps the CMI taps a different domain of knowledge than SIGI provides. SIGI gives specific information and assists in value clarification and decision-making skills. In measuring career development process and mastery, the Attitude Scale may not be sensitive to these specific skills and knowledge which SIGI purportedly provides.

Or perhaps SIGI may not affect those attitudes which lead to career maturity as measured by the Attitude Scale. All are possible conclusions that could be drawn from the available data.

The Career Information Questionnaire

It was hypothesized that after interacting with SIGI, a subject would have a clearer understanding of what course of academic studies he would pursue and what type of occupation he would choose to enter. Additionally, he would be more firm in his academic and vocational choices, and more committed to them. Results of the investigation revealed that after interacting with SIGI, subjects were no more able to state the choice of either an occupation or a major than were control subjects. There was, in fact, a tendency to be less able to state these decisions than before interacting with SIGI. The SIGI program may have provided subjects with a greater number of academic or vocational choices than they had been previously considering. If this was the case, then treatment subjects could have been in the process of considering several of these choices and at the time of the posttest were not ready to make decisions. The results of this question may have been different if the posttest had been administered immediately after interacting with SIGI or if it had been given several months later.

Although differences were not significant, there did appear a trend in the treatment subjects' commitment to those academic and vocational choices they had already made. Possibly interacting with SIGI confirmed those choices of a major or an occupation which had been tentatively made. If so, the confirmation of previous decisions and the positive reinforcement of choices tentatively made would prove to be of valuable assistance to subjects.

Comparison of Treatment Subjects by Sex and by Academic Program

The differential effects of SIGI on male and female treatment subjects were investigated to determine if one sex might benefit more from the SIGI program. Females did score significantly higher on the posttest Attitude Scale and on the Competence Test - Part I but no other significant differences were found.

The effects of SIGI upon subjects enrolled in the Associate of Arts program compared to those in the Associate of Science (vocational-technical) program also were examined. Because Associate of Science subjects would be entering an occupation much sooner than other subjects and because their studies are more vocationally-oriented, it was thought that SIGI may have a greater effect upon their career maturity and choice of an occupation. Findings did not support this, however. The paper and pencil inventories used in the study and the amount of reading required as part of the SIGI program may have discriminated against subjects in some programs which do not require much reading or test-taking. Possibly Associate of Science students do not feel any greater pressures to decide on a major or occupation than do the transfer students. In either case, it appears that SIGI has no greater effect on subjects enrolled in one curriculum as compared to others.

Motivation of Subjects

The motivation of clients is a major factor in the success of any type of personal or vocational counseling. Clients must have the desire to change or make a decision and must believe that this is possible to do through a guidance program if they are to be successful in their efforts. The motivation of subjects in a study such as this is an important variable and can greatly influence the outcome of a study.

Both the researcher and the BE 100 instructors stressed the voluntary nature of participation in the project to students, and students were asked to volunteer if they wished assistance in deciding on a major or a career. A vast majority of students in these classes volunteered to be subjects, possibly because they wished assistance, but also possibly because of some unknown peer pressure to participate or the unfounded belief that participation would be rewarded through grades in the course. The motivation for participation is not known. Many subjects had to be contacted about rescheduling missed appointments, causing some questions about their motivation to participate. While the sample of subjects was representative of the student body at the community college, it was not necessarily representative of those students who feel such a strong need for career counseling that they go to a counseling center or a SIGI office to seek assistance purely on their own motivation. Perhaps SIGI would have different effects on this latter population than on one which had not on their own volition sought out career counseling.

The Interval between Pretesting and Posttesting

A five week interval between pretest and posttest was used in the investigation for two reasons: (1) to provide ample opportunity for subjects in group I and group III to complete the SIGI program, and (2) a four to six week interval had previously been used in several other research studies on career development programs. Many of these previous studies, however, involved group counseling as a treatment, and subjects met on a weekly basis for two-hour sessions. This involved approximately ten hours of personal contact and ended shortly before the posttest. The very nature of the SIGI program is, however, different. It involves only two to four hours to complete and is very individualized. One subject in the treatment group may have taken the posttest 33 days after completing SIGI, while another, only one day after using the program. The majority of treatment subjects did complete the program during the second week of the project, and perhaps there were immediate effects of SIGI on these subjects which diminished by the time of the posttest. Future studies might be designed to posttest individually after each subject's completion of SIGI to determine if there are any immediate effects.

Suggestions for Further Research

The results of this study suggest that further research in several areas is warranted. The development of instruments designed to measure all facets of one's career maturity is needed, and consideration should be given to the special needs of the college student population in designing these instruments.

Much research on SIGI remains to be conducted. One could study only those students who requested to use SIGI completely on their own, thereby using subjects who are highly motivated to learn about themselves, occupations, and decision-making. The effects of using SIGI more than one time could also be studied. Interacting with certain subsystems on multiple occasions may prove to have greater impact on vocational maturity than results of the present study indicated. The length of time between treatment and posttesting could also be varied to determine both the short-term and long-term effects of interacting with SIGI.

Whether SIGI can be effective by itself or whether it is more beneficial when combined with some other form of career intervention remains to be determined. Experimentation with various forms of career guidance combined with SIGI could be undertaken. One could also directly compare SIGI with a structured individual or group counseling approach.

Finally, other outcomes of SIGI could be studied, such as its effects on a student's values clarification, specific information on particular careers, and on his commitment to academic and vocational choices.

Conclusions of the Investigation

Considering the possible limitations of the study cited in Chapter III and in the above discussions, the following conclusions can tentatively be drawn. First, the SIGI program does not appear to significantly affect those vocational behaviors of college students as measured by the CMI, i.e., career attitudes, knowledge of self, knowledge of occupations, and choosing a career. Secondly, the SIGI program does not appear to significantly affect the student's choice of an academic major or the choice of an occupation, although there are indications that it may strengthen one's commitment to a choice already made. Thirdly, there are no differential effects of the SIGI program on the basis of one's sex or academic program.

It was thus found that SIGI did not have any significant effect on the selected factors of vocational maturity as measured by the instruments used in this investigation. There are, of course, other aspects of vocational behavior that were outside the scope of this study, and SIGI may have considerable impact on these variables. Some of these, such as specific information about particular occupations and a deeper understanding of one's values, may best be measured by personal interviews or by different types of instruments. Although this study failed to demonstrate that SIGI has effects on the variables considered, other studies employing different instruments and measuring other variables may provide experimental evidence of the benefits of this new form of career guidance.

APPENDIX A

PRETEST CAREER INFORMATION QUESTIONNAIRE

Name________________________________ BE 100 Section No.__________

Sex: _____ Male _____ Female Age:_____

I. Academic program in which you are currently enrolled:

_____ Associate of Arts Program

_____ Associate of Science Program

_____ Certificate Program

_____ Other. Please state:________________________________

II. Have you made any decisions on an academic major? _____ Yes _____No

A. If yes, then please indicate in what department you plan to major:

____

B. How firm are you in your decision to major in this field?

_____ I have made a definite decision.

_____ I have made a decision but could possibly change my mind.

_____ My decision is very tentative, and I could easily change my mind.

III. Have you made any decisions on an occupational choice? ___ Yes ___No

A. If yes, please indicate what job or jobs you are considering. List one or more and be as specific as you can be at this time:

____

B. How firm are you in your decision to enter this occupation?

_____ I have made a definite decision.

_____ I have made a decision but could possibly change my mind.

_____ My decision is very tentative, and I could easily change my mind.

- -

(Please leave this space blank)

Grp. No._____ SIGI_____ Comp._______ A_______

Att._____ #1_____ #2_______ #3_______

APPENDIX B

POSTTEST CAREER INFORMATION QUESTIONNAIRE

All information is confidential and will be used only by the researcher unless you indicate otherwise in section six below.

Name____ BE 100 Section No.______

I. EDUCATIONAL BACKGROUND

A. The number of terms of community college or university work that you have completed, including this term, is ______

B. The number of these terms that you have been attending as a full-time students is ______

II. EMPLOYMENT BACKGROUND

A. Have you had any full-time work experience other than summer jobs?

_____ Yes _____No

B. If yes, please indicate the number of years of full-time employment:

_____One year or less _____Three years

_____Two years _____Over three years

C. Are you a veteran of the armed forces? _____Yes _____No

III. EDUCATIONAL PLANS

A. Have you made any decisions on an academic major? ____Yes ____No

B. If yes, then indicate in what department you plan to major:

____

C. How firm are you in your decision to major in this field?

_____I have made a definite decision.

_____I have made a decision but could possibly change my mind.

_____My decision is very tentative, and I could easily change my mind.

IV. CAREER PLANS

A. Have you made any decisions on an occupational choice?

_____Yes _____No

B. If yes, please indicate what jobs or job you are considering. List one or more and be as specific as you can be at this time:

____

C. How firm are you in your decision to enter this occupation?

_____I have made a definite decision.

_____I have made a decision but could possibly change my mind.

_____My decision is very tentative, and I could easily change my mind.

V. CAREER GUIDANCE RECEIVED

A. Have you received any assistance from a counselor in making decisions on a career choice during the past five weeks?

_____Yes _____No

B. If yes, approximately how many hours did you spend with the counselor?

_____Less than 1 hour _____1 hour _____2 or more hours

C. Have you completed the SIGI program? _____Yes _____No

D. If yes, do you feel like you need to see a counselor in making some career and/or educational decisions?

_____Yes _____No

E. If yes, then what types of information do you think you still need?

____

____

____

VI. RESEARCH RESULTS - Please check one:

_____I want the scores and information that I have provided as part of this research to be given to my BE 100 instructor so I may see them.

_____I wish all the information that I have provided as part of this research to be kept confidential and not be made available to my instructor.

Grp #_____ 1_____ 2_____ 3_____ 4_____ 5_____

Pre-Att___ 1_____ 2_____ 3_____

Post-At___ 1_____ 2_____ 3_____

APPENDIX C

EXPERIMENTAL GROUP ASSIGNMENT BY SEX AND BY ACADEMIC PROGRAM

BY SEX:

		MALE	FEMALE	ROW TOTAL
Pretested SIGI	N =	10	8	18
	% =	56	44	
Pretested Control	N =	16	7	23
	% =	70	30	
Untested SIGI	N =	12	10	22
	% =	55	45	
Untested Control	N =	10	11	21
	% =	48	52	
COLUMN TOTALS		48	36	84

Chi Square = 2.306 df = 3 Significance = 0.511

- -

BY ACADEMIC PROGRAM:

		ASSOCIATE OF ARTS	ASSOCIATE OF SCIENCE	CERTIFICATE PROGRAM	ROW TOTAL
Pretested SIGI	N =	14	3	1	18
	% =	78	17	5	
Pretested Control	N =	19	3	1	23
	% =	83	13	4	
Untested SIGI	N =	12	9	1	22
	% =	55	41	4	
Untested Control	N =	14	6	1	21
	% =	67	29	4	
COLUMN TOTALS		59	21	4	84

Chi Square = 5.640 df = 6 Significance = 0.462

APPENDIX D

EXPERIMENTAL GROUP ASSIGNMENT BY WORK EXPERIENCE AND BY SECTION

HAVE YOU HAD ANY FULL-TIME WORK EXPERIENCE?

	YES	NO	ROW TOTAL
Pretested SIGI	13 (72%)	5 (28%)	18
Pretested Control	18 (78%)	5 (22%)	23
Untested SIGI	20 (91%)	2 (9%)	22
Untested Control	18 (86%)	3 (14%)	21
COLUMN TOTALS	69	15	84

Chi Square = 2.779 df = 3 Significance = 0.427

- -

BY BE 100 SECTION IN WHICH ENROLLED:

	02	05	08	09	10	11	16	17	24	25	ROW TOTAL
Pretested SIGI	1	1	2	2	1	3	3	2	1	2	18
Pretested Control	3	3	3	2	2	1	2	2	3	2	23
Untested SIGI	2	2	3	1	2	2	2	2	3	3	22
Untested Control	2	3	5	2	1	0	0	4	3	1	21
COLUMN TOTALS	8	9	13	7	6	6	7	10	10	8	84

Chi Square = 14.201 df = 27 Significance = 0.979

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BIOGRAPHICAL SKETCH

Howard Francis Devine was born March 13, 1945, and attended parochial schools in Illinois. He was graduated from Schlarman High School, Danville, Illinois, in 1963. He received a Bachelor of Arts degree in 1967 from Creighton University with a major in psychology and minors in philosophy and sociology. His interests in drama and photography began to grow during this period.

He was a student personnel assistant and a residence hall assistant director during two years of graduate studies at Ohio State University. He majored in counseling and developmental psychology and minored in college student personnel, receiving a Master of Arts degree in 1969.

From 1969 to 1971 he was an instructor in psychology and a residence hall director at Illinois State University. He left Illinois to become Assistant Dean of Students at Marquette University, a position he held from 1971 until 1973.

He was awarded an Educational Professional Development Act Fellowship in 1973 for full-time doctoral studies in Counselor Education at the University of Florida and has minored in higher education administration. An interest in career counseling and in community college student personnel developed during his two years of doctoral studies.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robt O. Stripling

Robert O. Stripling, Chairman
Distinguished Service Professor

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James L. Wattenbarger

James L. Wattenbarger
Professor of Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Harold C. Riker

Harold C. Riker
Professor of Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August, 1975

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